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AUTOMOTIVE INDUSTRIES
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Why Not Discard the *Double Standard* in Buying and Selling?

Integrity of contracts is the foundation of business. Most firms recognize this principle in sales work, but many fail to do so in purchasing. What's the reason?

By Harry Tipper

IT is a trite saying that the integrity of contracts is the foundation of modern business. This, however, is not so commonly considered on the buying side of the business as it is on the selling side. The same business man, who in connection with his sales is prepared to render a maximum of service to establish the thorough confidence of his customers, frequently buys in such a way as to make it difficult for his supply sources to place any reliance on his confidence, square dealing and good-will.

In his own sales work the manufacturer expects that the integrity of contract between himself and the one who buys from him will be preserved. He expects that if he deals fairly with his customers they will deal fairly with him. Yet at the same time as a buyer he is making his contracts in such a way as to be unfair to the seller.

A company in the automotive business, for instance, enjoying the confidence of the public in connection with its own product, and expressing in its advertising the policy of fair dealing, fair value, as a basis of business, recently refused to renew a contract with one of its sources of supply on a slight price difference, although the company from whom it had been securing the material had been carrying a large bill for many months, and was still carrying the bill when the contract was changed.

THIS buyer made the bald statement that price was the only consideration in the contract, because the specifications and tests would govern the material. The company refused to take into consideration the fact that it had been using the supplier's money to a considerable sum for a long time, and informed the supplier that that was a matter which did not concern the buyer.

This is not the way to establish confidence between buyer and seller. There is an integrity of buying, as well as an integrity of selling. Just as the square fulfillment of contracts and obligations is the foundation of modern business, so the destruction of confidence wastes time and effort and money to a very much larger degree than the small temporary advantage secured by sharp trading and price pressure.

We have not yet arrived at that understanding of efficiency which recognizes that suspicion is the reason for, and the source of

IS there any logical reason why a manufacturer should apply one standard of ethics to dealings with his customers and another to dealings with his sources of supply?

Harry Tipper doesn't think that there is. He gives his reasons without equivocation in this article, which is the eighth in a series on "Profits vs. Production." Every executive will want to read what he has to say.

Next week Mr. Tipper continues his discussion of the economics of purchasing in an article dealing with the value of stable sources of supply.

a very large part of, the waste motion which occurs in the buying of supplies and materials, the development of deliveries, uniformity of product, and the indirect expense of the factory. The purchasing agent compares prices and compares the conditions of various suppliers, because he has no confidence in the integrity of their position. The supplier protects himself by price differentials, by contractual clauses, extra sales efforts and other devices, because he has no confidence in the integrity of the purchaser.

All of these measures must be paid for, and they are continually adding their toll to the cost of the product.

Reputation of Square Dealing

Where the manufacturer is selling his goods to the public he has come to appreciate the profit value of a reputation for square dealing. He knows that the average individual once convinced that he is getting proper value and fair service is inclined to buy again without much expensive effort in selling.

In the sale of products, however, from industry to industry, this understanding is not as clear, and the methods adopted in the sale from one industry to another, and in the buying of one industry from another, there is not the endeavor to establish that basis of confidence either on the part of the buyer or seller, which has been recognized as of great importance in doing business with the general public.

It is the buyer, however, who is in the best position to take advantage of integrity in a business transaction. The buyer who is square in his dealings on contracts, who recognizes his obligations to the seller, and who is wise in his knowledge of the market, is a very profitable and attractive customer, not because he pays any more, but because it costs less to do business with him.

The books of one manufacturer of parts in the Middle West show the records of business done with one concern whose contracts and delivery orders are regularly lived up to and of other concerns whose delivery orders are cancelled, whose contracts are rearranged without regard to the stock and finished inventory accumulated on their account. The customer who has dealt fairly in keeping the terms of his contract does not pay any higher price than the others, but the parts manufacturer would be out of business if he did not have some of these customers from whom he can draw a profit.

Legality Is Not of First Importance

The legality of the action between the buyer and the seller is not of any importance. Business is strictly an interchange; efficiency depends upon the speed, the regularity and the volume of the interchange. Anything which tends to reduce the speed, interrupt the regularity or fluctuate the volume, adds cost by decreasing efficiency. Unfulfilled contracts, change of contracts, cancelled orders and the failure to recognize faithful service, delay the speed of the transaction, interfere greatly with the regularity in the interchange of product and enlarge the expensive fluctuations of business.

The fact of the matter is, whether we recognize it or not, that an interchange which involves buyer and seller is a cooperative action and requires cooperation. Friction engendered in these transactions is just as definite a cause of waste as friction in a manufacturing plant. It cannot be measured by the same mathematical means, but it can be accurately determined by an examination of the history of different concerns.

Friction Involves Waste

The failure to recognize the large waste brought about by this continuous friction between the buyer and seller is one of the causes of the wide fluctuations of business which occur in the United States; it is one of the reasons for over-productive capacity; it is one of the reasons for destructive price cutting, and it is one of the reasons for the banking control of business concerns. It has been particularly characteristic of the automotive field.

The automotive manufacturing buyer, whether deservedly or not, has a reputation for loose methods in dealing with contractual relations; he is frequently charged with cancellation of contracts on specification items when they have been partially fabricated, or carried in considerable investment in raw inventory. He has been charged with many other delinquencies in connection with the contract. The seller is undoubtedly equally at fault with the buyer in this regard, but the net result is that manufacturers are obliged to introduce a larger differential in considering their costs because of the additional waste incidental to these elements of friction.

Obligations to the Seller

The first principle of effective selling is the establishment of confidence on the part of the buyer in the policy of the selling organization, and the first principle of good buying is the recognition of the fair, square buying obligations to the seller. It is not necessary to disregard contractual arrangements in order to protect the buying organization.

In the long swing of business over a period of years it can be amply proved that neither the cost of the goods that are bought nor the profit of the buying organization is dependent upon taking advantage of the seller. In fact, over a period of 20 or 25 years in the business history of the United States in all lines of business it is possible to pick out concerns who have been as faithful to their policies in their buying as they have been in their selling, and in all cases the records of such companies will show a steady growth and a better profit for the volume of business that they have done.

Striking examples of the persistence of trade when the relations between buyer and seller have been satisfactory are to be found in the changes due to the war and the returns to the old methods of trade after the war.

Several European countries had been accustomed to supplying other parts of the world with many of their manufactured commodities. In some of these cases the known dependence of the buyer upon the seller's probity had been sufficiently acknowledged by the actions of the seller, so that trade had extended for many years between individual companies, and even whole countries, along the same lines. Despite

the changes in the industrial developments in some periods, this trade persisted because of the foundation of square dealing, which had developed a long habit of confidence and good-will.

War Dislocated Buying Relations

These relations were entirely dislocated in some cases by the war, which demanded the concentration of immense efforts upon the prosecution of the conflict. Buyers were obliged to seek their products elsewhere to such a degree that the main channels of trade were altered materially. In fact, there was a good deal of discussion as to the permanent alterations which would occur in the trade of the world due to these dislocations.

Since the war, however, there has been a gradual return of trade to its old channels, and in some of these cases the return was rapid and fairly complete. Whatever may have been the features of the new developments of trade, the confidence developed by years of satisfactory dealing was not to be displaced by so short a term of dislocation. In the cases where the new products were not as represented, or the policies of the new sellers not as fair as the old, there was a very rapid return to the old channels as the countries got back to production.

Business men in any export country can tell you with considerable accuracy those districts of the world where dependence can be placed on the buyer for his probity in buying. Buyers in all parts of the world have acquired beliefs and prejudices regarding the honesty of the seller, arising out of their experience with the different producing units.

In these cases the measure of square dealing that has existed between buyer and seller in their trade relations and traditions over many years has been the principal element in resuscitating the trade of those countries whose export business was entirely dislocated by the war and who are recovering that trade as the rearrangement of the production facilities makes it possible.

In other words, it is well recognized in the export business that the foreign buyer who buys with a decent regard to square dealing with the seller is a very desirable customer, and the buyer himself recognizes that the supplier who deals squarely with him is a very desirable source from which to buy.

Specific instances might be stated where large lines of business were lost to the original supplier during the war but have returned to the regular channels since, and well-informed men state as the principal reason for this return to the buyer's dependence upon the seller's square dealing.

It would be invidious, however, to make such statements definitely, because the inferences would be carried much further than the actual facts would warrant. Any man who thinks about the matter can see by the trade reports the actual working out of these elements in their effect upon the conduct of business.

We have been accustomed to consider that modern business, with its organization, was not human, but was just business. But modern business is governed by human beings, and their reactions govern the character of the organizations they choose to do business with. When the reason for good or bad business relations is pursued to its beginning, the difficulties always involve the human policy and character of the organization.

Increased Confidence Necessary

Speed of interchange in business, regularity in the flow of the product, and stability in the volume can be improved only by an increase in the confidence between buyer and seller. Better buying takes into consideration not merely the present transaction of buying, but the maintenance and development of stable, adequate and skillful sources of supply; it takes into account the relations over a period of years and their effect upon the business. The long vision on buying should govern the short transaction, just as the long plan on sales must govern the immediate campaign.

The automobile business has suffered from the disposition to buy on price only; to regard a contract merely as a piece of paper, and to believe that the advantages of the buyer were more important than the profit of the seller regardless of any predicament he was bound to face.

The costs will be reduced as the interchange is conducted more definitely in accordance with its true necessities of cooperation and fair dealing.

More than one company in the automotive industry is giving serious attention to this phase of their business. It is becoming more generally recognized that fair dealing in buying as well as in selling has a definite effect on lowering the overhead costs of the industry as a whole. Individual companies will benefit as part of that whole.

Isn't It True That—

THE legality of any action between buyer and seller is of relatively little importance?

Modern business would fall to the ground were the laws of the land not reinforced by ethical and moral considerations in industrial transactions?

Broken contracts mean increased costs, bad feeling within the industry, and wasted material and effort?

Blues and Maroons Give Way to So-called Dust Proof Colors at Annual Salon

Grays, greens and browns, often in two tone effects, popular.
Vogue of black superstructure and top may be coming to an end.
Maybach, Excelsior and Mercedes six are the new cars shown.

THAT the Automobile Salon, which is being held at the Hotel Commodore, New York City, this week, is gradually changing from a show of foreign cars to one of custom-built bodies has never been so apparent as this year. The former official title of Importers' Automobile Salon was dropped some years ago, and this year there are exhibits by sixteen body builders as compared with exhibits by only eleven car manufacturers and importers. Of the eleven manufacturers showing three are American, and two each are Belgian, French, German and Italian. The only strictly new car at the show is the six-cylinder 25/100/140 hp. Mercedes with aluminum engine and supercharger, of which an illustrated description appears elsewhere in this issue. Also new to the American market are the Belgian Excelsior and the German Maybach, of which latter a technical description was published in our issue of Nov. 6.

With no less than eighty-two cars and chassis on view, the ball room of the Commodore is crowded and a new record is established for the Salon. Only five stripped chassis are shown, which is perhaps not a bad showing considering the fact that there are only ten car exhibitors, but they are almost lost between the multitude of coachwork exhibits.

Following is a list of the cars exhibited by their manufacturers or importers; Cunningham, Duesenberg, Excelsior, Isotta-Fraschini, Lancia, Maybach, Mercedes, Minerva, Renault, Rolls-Royce and Voisin.

Custom Body Builders' Exhibits

American cars of the following makes are exhibited by coachbuilders: Cadillac, Lincoln, Locomobile, Marmon, Mercer, Packard, Peerless, Pierce-Arrow and Wills Sainte Claire. Coachwork is exhibited by the following firms: American, Blue Ribbon, Brunn, Derham, Dietrich, Fisher, Fleetwood, Holbrook, Hume, Judkins, LeBaron, Locke, Merrimac, Springfield, Willoughby and Wilson.

A count of the wheels fitted to the different jobs on the exhibition floor showed that 47 per cent of them were wood wheels, 37 per cent wire wheels and 16 per cent disk wheels. It is rather remarkable that the wood wheels are so well holding their own, especially in view of the fact that a lot of changes in wheels must have been made on account of the adoption of balloon tires, which are very conspicuous at the Salon.

A peculiarity of the Excelsior car, shown here for the first time, is that its six-cylinder engine has three carbureters fitted. Evidently the inlet valves of adjacent cylinders are siamesed, as each carbureter is connected to the cylinder block by means of an L fitting. Another car at the show with more than one carbureter is the eight-cylinder Isotta-Fraschini, which has two.

On the Excelsior there is a system of links and levers between the central housing of the rear axle and the frame which prevents rolling of the frame. The latter is free to move vertically with respect to the axle but has no transverse freedom.

At least four cars with overhead camshaft engines are to be seen at the show, namely, the Duesenberg, Mercedes, Excelsior and Lancia, which would indicate that the difficulties encountered in trying to make an engine of that type run quietly have been exaggerated.

Lancia Shows Frameless Body

Considerable interest was shown in the small Lancia car, which is of the frameless type and is of such low build that a person of ordinary size looks over the top of the closed body. This car has a four cylinder 3 by 5 in. engine. The front axle is rigid with the frame and the front suspension is by coiled springs inclosed in a housing at the steering heads.

At the Maybach stand is shown an engine for dirigibles similar to the engines used on the ZR-3, which recently made the flight from Germany to this country. This is a 12-cylinder V type engine developing about 440 hp. and weighing in the neighborhood of a ton. The rather high weight is said to be justified by the low fuel consumption, given as 0.42 lb. p. hp.-h at the most economical speed, viz., 1300 r.p.m., and the durability of the engine as represented by the number of hours' service it will give before requiring an overhaul. The engine is started by compressed air.

Superstructures with a touch of color, sometimes with fabric leather quarters and decks to match, cowls which narrow rapidly between windshield and hood, moldings which run the full length of the body and hood, use of somewhat decorative windows and of raised hood panels, two-tone paint jobs, many of them in dull or semi-luster finish, and a prevalence of grays, greens and several tones of brown running from a dark chocolate to a light buff are among the things which catch the eye at the annual Automobile Salon.

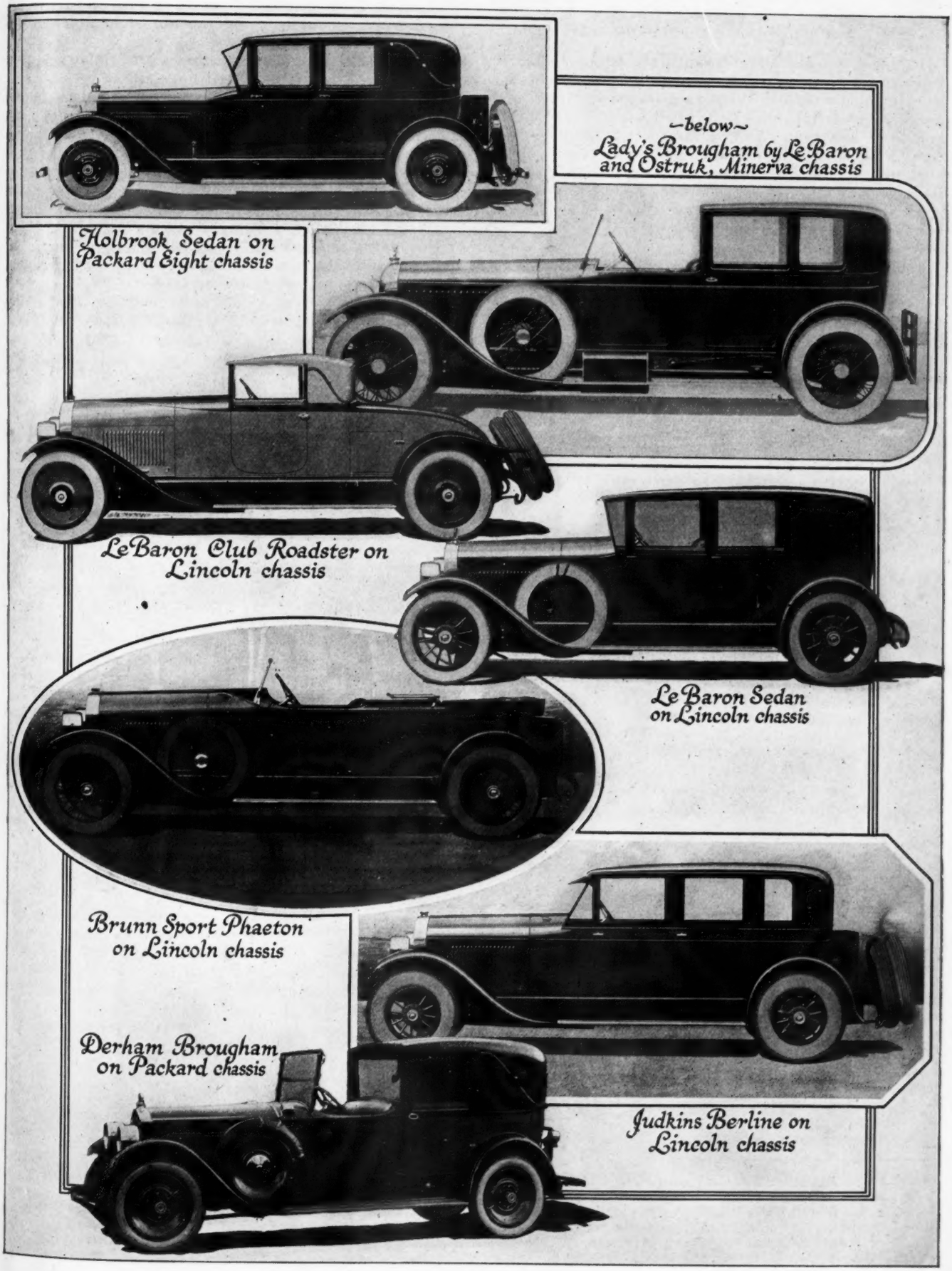
Production and Custom Bodies Similar

Novelties are surprisingly few and there is considerably less difference between the average custom body and the average high grade production body than there has been heretofore. This is due partly to the fact that the production body builder has seized quickly upon improvements introduced by the custom builder and applied them to his own product, and partly to the fact that some production builders have their own "custom" departments which create designs rivaling those of the exclusively custom builder in refinement and artistic merit.

Lincoln, Packard, Marmon, Cadillac, Locomobile and Pierce-Arrow are among the prominent manufacturers who have several chassis with custom bodies on exhibit. These are shown, of course, under the name of the body builder, for the show is essentially a body builders' exhibition. A few foreign chassis are shown stripped, but even the bulk of the imported jobs have custom bodies, many of which are American products.

As compared to the foreign products, many of the domestic cars have a somewhat stubby appearance, due

Smart Cars Seen at New York Salon



in part to the wider bonnets and broader bodies, but the narrowing of cowls and the use of moldings running the full length of hood and body are helping to obviate this effect.

Fewer All-Black Superstructures

All-black superstructures still are popular, but the proportion of these is greatly decreased. There is a growing appreciation of the fact that a distinctive appearance is obtainable easily when the parts above the belt line are finished in colors which harmonize or form a pleasing contrast with those used on the lower portions. In many cases fenders also are finished in a tone or color other than that of the body and not in the conventional black, but in a few cases the entire body is black with only a touch of color in the form of a hair line stripe.

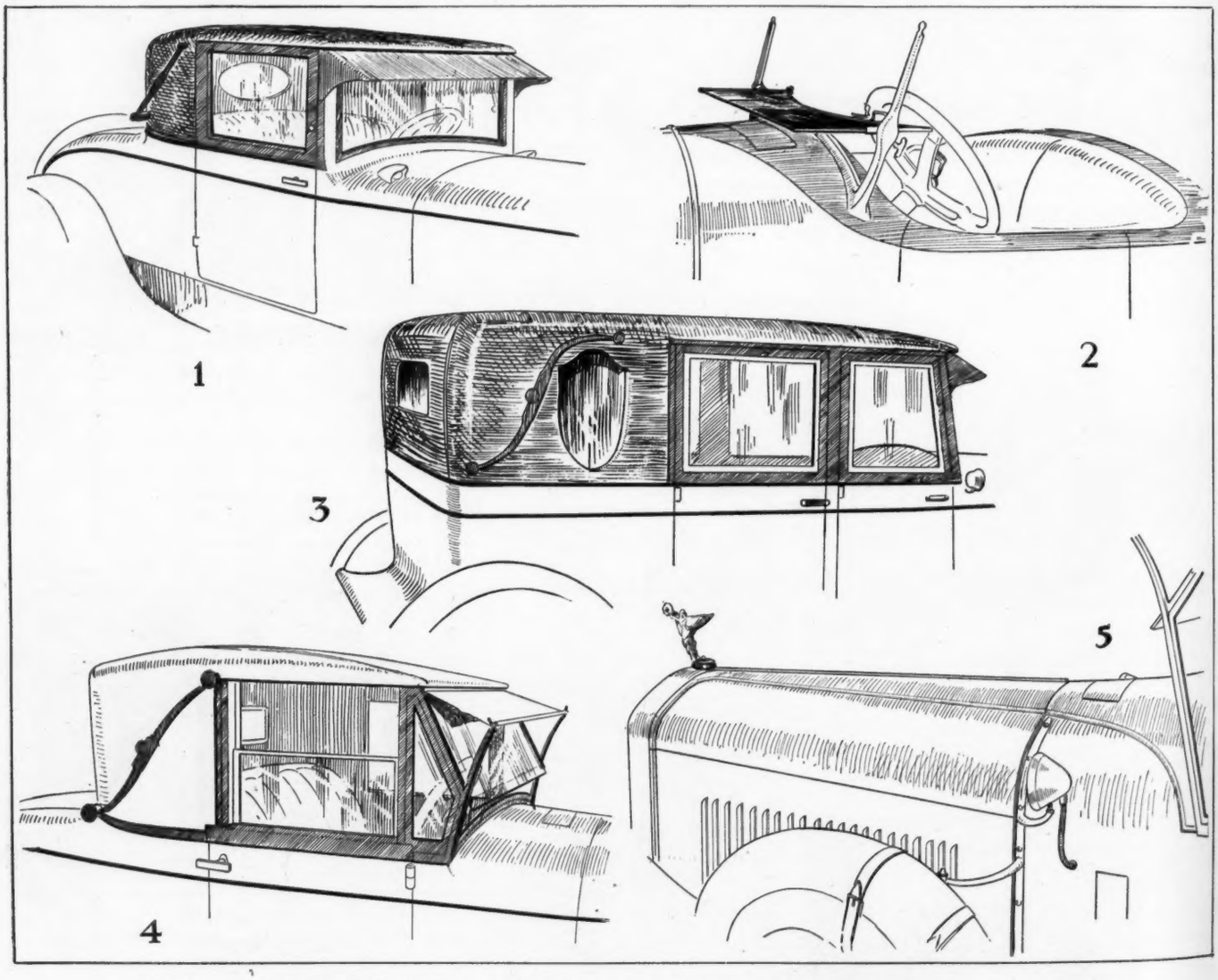
Comparatively few bodies have a pyroxylin finish, due, no doubt, to the proverbial conservatism of body finishers and the fact that their personnel is trained in brush finishing with varnish, while the sprayed on cellulose, with its advantages from a manufacturing standpoint, are of less moment where hand work at comparatively moderate speed is a rule.

A number of lacquered jobs were on exhibit and made a very favorable impression, but even when a deep luster was not desired a varnish finish often was used. In such cases there generally was no special effort to hide brush marks, possibly to add to the hand finished appearance.

It should not be understood that glossy finish jobs are not popular. There is nearly, if not quite, the usual proportion of these, as compared to earlier salons, but it would seem that less emphasis is being placed upon the matter of high gloss than heretofore.

Blues and maroons, among the popular colors of past seasons, are in a decided minority. Considerable preference for the so-called "dust-proof" colors, among them grays and browns, is noted, while many greens of shades varying from Brewster to light pea are in evidence.

Use of two-tone effects, with body proper in one color and superstructure, and perhaps wheels and fenders, in a darker shade, are much used. Even the black deck and quarter covering, which is so common that many seem to have forgotten that durable colored fabric leather is available, is giving place to gray or brown fabric leather in some cases. One is led to exclaim: "Well, why should every car have a black top covering!"



1—Judkins coupe on Lincoln chassis. Body is light buff and top a darker color except for part of the front pillars which are painted to match body. Note dark molding. 2—Windshield and pointed deck panel on Brunn sport phaeton. A similar windshield is fixed to hinged cover back of front seat. 3—Fisher sedan on Cadillac. Note unusual shape of windows and how rear panel is curved out at the bottom. 4—Folding top of Pierce-Arrow coupe roadster. Top is of light color. 5—Hood and cowl on Isotta

Disk wheels, formerly shunned to a large extent in salon exhibits, have come into their own. Wire and wood also are much used, but the coming of balloon tires has made the wheel smaller, and large brake drums on all wheels of most cars in the higher price class close all space between spokes, anyway, so that spoked jobs lack somewhat of their former characteristic appearance. When wood is used, the spokes often have a natural finish without paint.

One-piece windshields are in vogue, but so also is the two-piece type. It remains to be seen which will be most used in the future. The Fisher V-V shield is the only one noted in which a quick adjustment with one hand can be effected. Much remains to be done in the way of fitting easily operated windshield regulators.

Windshield pillars also leave much to be desired from the standpoint of minimizing blind spots. Structural features appear to demand a heavy pillar, but the desire for better visibility in all directions may in time force changes in this respect.

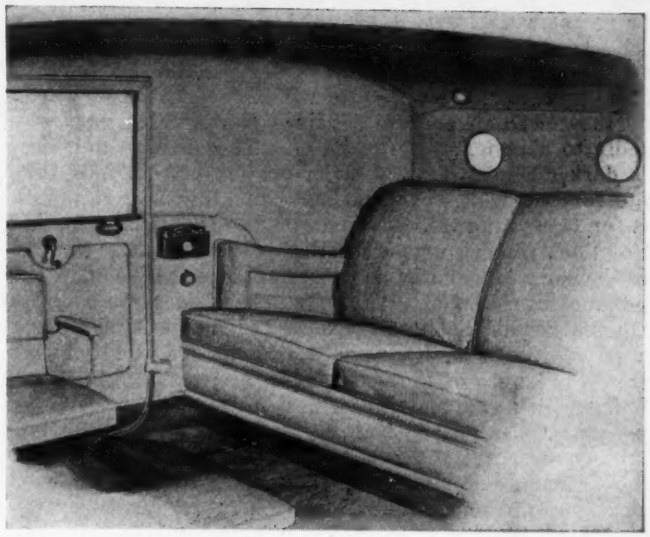
Shapes and Sizes of Windows

Windows of all shapes and sizes are being used. One or two small elliptical windows in the rear panel are employed in some cases, while on the other extreme a large oblong window is chosen. In some cases the quarter windows are made narrow, largely for appearance sake and to enable use of an ornamental landau joint, which is placed on both collapsible and non-collapsible tops. One of the custom built Fisher bodies on a Cadillac chassis had a shield-shape window in the rear quarter.

Interior trimmings of a wide variety are seen, as usual, but broadcloth appears to be the most popular fabric. Bedford cord, various woolen fabrics and some brocaded materials are present in about the usual proportions, while a few leather interiors were observed, chiefly in bodies with folding tops.

Bodies of the Berline type, with a lowerable glass partition between front and rear seat, are quite numerous. They have the advantage of convenient use either by an owner-driver or with a chauffeur at the wheel, the partition being raised in the latter case. Many such bodies have the front seat trimmed in leather and the rear in broadcloth, but in at least one case the same fabric was used for both seats.

In many instances 2-in. stuffed cushions are provided over the spring cushion of the rear seat, a construction



A pleasing interior without decoration by LeBaron

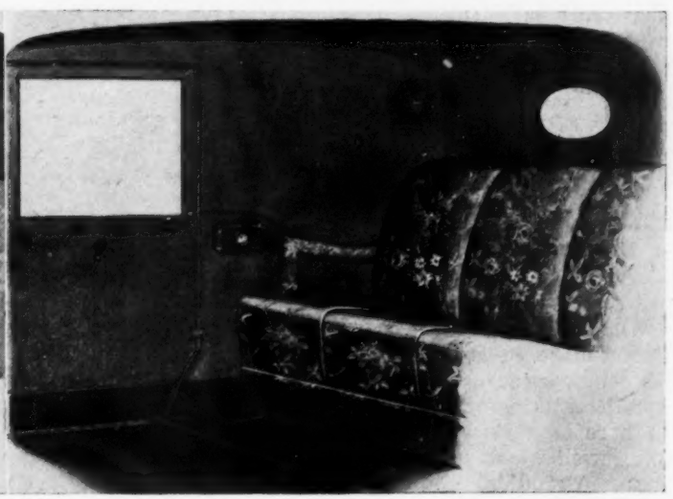
which resembles the "over-stuffed" furniture now popular. These cushions are removable easily for cleaning and can be made reversible to give longer service than a fixed covering over a spring frame.

Some tufted upholstery is in evidence, but a large majority of jobs have either straight plaits or plain, unplaited seat and back covers, much as they have had for several years past. There are some much decorated interiors, two of which are shown in accompanying cuts, but a large percentage of cars still have quite plain trimmings, although broad lace seems to be used more than it has been in the last few years.

A few bodies, including some by Fisher and some imported jobs have decorative walnut inlaid panels on doors and at the back of front seats, but there is no general tendency to add this form of embellishment.

A somewhat unusual body type, termed a club roadster, made its appearance on Lincoln and Pierce-Arrow bodies. It is similar to a roadster, except for the top, yet has the advantage of a coupe landaulet, since the inclosure is complete when the top is up. In this case, however, the entire top folds back and the metal framed windows lower into the doors, so that the open features of the roadster are retained. A photograph of one LeBaron body of this

Queen Marie Antoinette decorative upholstery by Wiese in LeBaron brougham



"Needlepoint" decorative upholstery by Laidlaw in Locke cabriolet

type on Lincoln chassis is reproduced on another page.

This body has another feature which is not entirely new but which seems likely to see wider use in the future, namely a rear deck, the lines of which are carried forward onto the cowl and hood in a raised panel which narrows rapidly to a point at the radiator. This deck is finished in a darker shade than the lower portion of the body, the ledge formed by the raised panel providing a convenient line for separating the two tones. The result is a graceful set of lines which suggest those of a fast boat and which give the car a longer and narrower appearance. A similar effect is obtained on some of the Isotta and Minerva bodies.

Double headed belt moldings spaced about 3 in. apart are popular. In many cases the lower of the two is carried the length of the hood, again giving a long, graceful line which frequently becomes the dividing point between two tones on the body.

Dickey seats are the rule on roadsters and some other bodies normally having a single cross seat. There are indications that phaeton bodies in the future are likely to be confined largely to sporting vehicles, which will be used much of the time with tops down. In this case a hinged cover over the middle section of the body forming a closed compartment for the feet and legs of rear seat occupants seems logical. The rear edge of this cover may well carry a rear wind screen which can be folded if desired. This construction is adopted by Brunn in one of comparatively few open jobs exhibited.

Mention of Brunn brings to mind a very striking effect achieved on two of his creations. In both of these the cases, practically all of the body proper up to the windshield and the disk wheels are finished in a light color, while the top, leather quarter, cowl, hood, fenders and splash aprons are black. A bright green stripe is used along the lower edge of the body, around the rear quarter and back panels and on the window bevels. Trunk and tires are carried at the rear.

There is no uniformity in the matter of carrying spare tires or wheels. Frequently they are fastened in wells in the rear portion of front fenders, but almost as frequently they are mounted in the rear. Many cars also have trunk racks at the rear, some of these being folding types and some extensions of the frame often with trunk designed to fit the body.

Nickel trim is as popular as ever and is used for the entire radiator shell in practically all cases.

A strange contrast is presented in the body on a Lancia chassis. This is the so-called "frameless" vehicle exhibited first at the Paris show some two or three years ago and fully described at that time in these columns. The body at the salon has what in this country is termed a winter top and the whole vehicle is so low that a man of average stature can look down on the deck, yet this is not a small car as measured by European standards! Besides the massive American cars it appears to be a decidedly diminutive vehicle.

Causes and Remedies for Brake Failure and Squeaks

ACCORDING to Frederick C. Stanley, chief engineer of the Raybestos Co., writing in *The Silver Edge*, "brake service stations report that in the majority of cases of inefficient brakes which come to their attention, there is no motion of the band possible at the anchor because of accumulated dirt and rust. This is no doubt the chief cause of brake failure. Scoring of drums is largely due to the character of the metal. High temperature on low carbon steel is frequently the cause of scored drums. And as it is improbable that manufacturers of cars will use a better quality of steel in drums, drums subjected to high temperature will continue to be scored. A slight difference in hardness seems to make a very great difference in resistance to scoring.

"The surface of scored drums should be improved to prevent local high pressure, which has shown to be the cause of scoring and resultant squeaks.

"Some service stations are equipped with grinders to resurface drums on wheels. We have had cases of squeaks which could not be entirely cured until the surface of the drum was improved.

"Improving the surface of the drum tends not only to avoid squeaks but to increase the life of the lining. It distributes wear more evenly besides making the adjustment to obtain the wrapping effect much less difficult.

"When drums are worn thin, that is, reduced 30 per cent or more in thickness, they should be renewed. A thin drum, because of its lower heat capacity, will cause rapid destruction of all lining.

"There is a very general opinion that some kinds of lining swell when drums are hot and lock brakes by doing so. At 500 deg. Fahr. a 17-in. drum expands 0.059 in. in diameter. Measurements taken over the drum and over the external band when the temperature is raised by brake application show that while the drum expands 0.059 in. at 500 deg. Fahr., the lining and band applied to it have not increased in thickness a measurable amount.

"Measurements of the gap between the ends of the lined band when applied to the drum with the same pressure, cold and hot, show a difference of 0.045 in. This would cause a pedal retraction of 0.945 in. in case of a mechanical advantage of 21:1. Such retraction would ordinarily be called swelling, yet it is apparent that with no wear or compression, the more rapid expansion of the drum accounts for all pedal retraction.

"It is evident that with an average clearance of 0.025 in. between lining and drum, an expansion of 0.059 in. on the diameter will take up all the clearance and lock wheels with no pressure on the pedal. When brakes are applied steadily on long grades, the driver feels the pedal rise against his foot, and if he persists in such continuous application, the pedal may come all the way back to the floor board. To get this result it is evident that there must be very little wear or compression of lining as, with a clearance of 0.025 in. and a pedal throw of 4 in., a wear or compression of 0.010 in. will mean 1.6 in. increase in pedal throw, and an adjustment would be needed when the drums became cold.

"All the effect attributed to swelling is drum expansion. There is no way to avoid it, except to avoid heating drums above 400 deg. Fahr. or increase clearance beyond drum expansion at higher temperatures."

THE Julius Pintsch Co. of Berlin, which is known for its gas lighting system formerly much used in railway lighting, has placed on the market a suction gas generator for commercial vehicles which can be operated with anthracite, charcoal, coke or peat coke. A saving of 80 per cent on fuel cost as compared with imported gasoline is claimed.

Just Among Ourselves

Be Careful! Human Lives Are at Stake!

THE words "vital," "important," "serious," and others of like character have been so heavily overworked in describing problems of one kind and another that when a really "important" situation arises it is difficult to express its "seriousness." The old words have lost their force through continued use in connection with relatively unimportant things. The report of the N. A. C. C. traffic committee, showing an increase in accidents for September and a grand total of over 14,000 fatalities for the first nine months of this year, bids us all stop short and think. Thoughtful consideration of this toll of human life must result in full agreement with the drastic measures urged by the N. A. C. C. for curbing the careless as well as the reckless driver. The traffic accident problem is getting more constructive attention than at any time in the past—and it needs such attention. Incidentally the forceful, specific and honest tone which characterizes the treatment of this subject in the N. A. C. C. traffic committee bulletins merits some special commendation. The detailed data and the frank statements of facts which they contain are in refreshing contrast to the clearly propaganda material so common in this day and age.

Industry's Influence Felt in Several Centers

IN the bulletin on September accidents it is interesting to note that progress toward greater safety was made in certain areas, despite the general increase in accidents, and that Detroit, the center of the automobile industry, is one of the few cities in which a marked decrease was recorded. It might be noted also that Yonkers, N. Y., home of the Alfred Reeves, is on the September honor roll of five cities in which there were no motor vehicle fatalities during the month.

Putting Parts in Foreign Markets

PARTS and accessory makers are awakening more fully to the need for serious foreign trade activity. There has been too much tendency in the past to look only at the fifteen and a half million cars registered in this country and to scoff a bit at the less than two million scattered about in other parts of the world. The car manufacturers have gone after foreign markets vigorously and have found them profitable. The parts and accessory makers can get the same profits if they go after them; but they must keep pace with the efforts of American vehicle builders if all American automotive products are to take their rightful place in world markets. There are signs of action—which is a good thing.

Are Truck List Prices Going Out?

ARE truck list prices going the way of tire lists? Enough commercial vehicles are being sold at varying prices to cause this question to be asked quite seriously. Some people deplore the tendency to abolish truck list prices and point out that tires and trucks are quite different commodities and are marketed quite differently. Others say they can't get much excited about it, because trading allowances and wild trading in general have made the list price more or less meaningless for a good while back. To which proponents of the list price reply that they are talking about a real list—not a fictitious one. We'll be glad to get your opinion on this question and refrain from publishing your name in connection with any comments you may make. We've already heard enough to know that a lot of men in the industry hold very strong views on both sides. Write a letter and air your views.

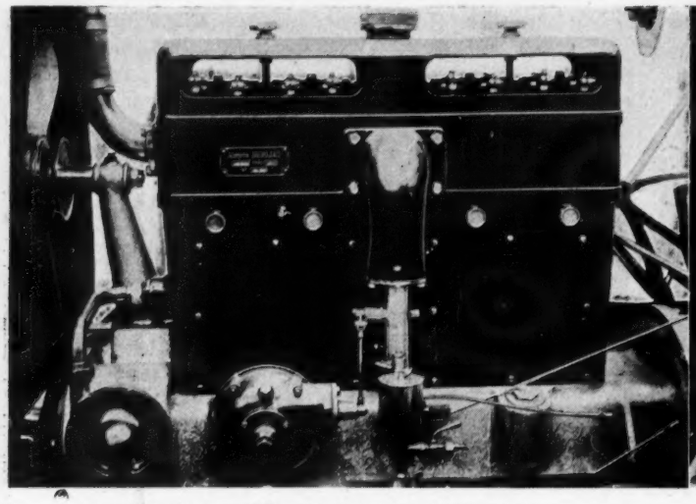
Where Are Car Prices Going?

AFTER everybody had been thinking that car prices were likely to go up, and after a number of increases had gone through, several decreases have been announced and now nobody seems to know just where they're going. It is almost inconceivable that the industry should precipitate another orgy of price cutting similar to that which featured the 1921 shows. Such action is not demanded by basic economic conditions, which are improving, and cannot bring any permanent good to the automotive business. The indications are that most prices will hold firm, with possible drops in a few intensely competitive lines. The likelihood of further increases, however, seems slight.

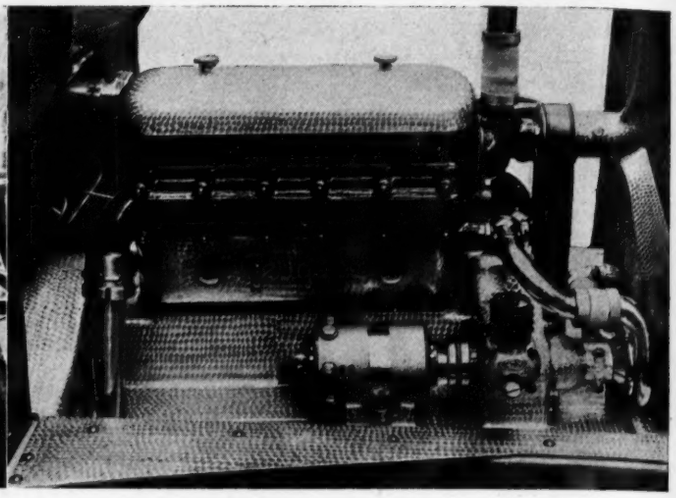
"Fighting Bob" Clancy Buried in Election Landslide

IT is with regret that we announce among other Democratic casualties in the recent election "Fighting Bob" Clancy of the First District, Michigan. Usually politics are taboo in this column but we can't refrain from mentioning the passing, perhaps temporarily, of the man who so valiantly fought the battle for automotive tax reduction on the floor of the House during the last session. Without reflection on the new incumbent, who is reported to be a particularly able man, it can be said that the industry is appreciative of Mr. Clancy's deep study and understanding of automotive problems.

N. G. S.



Berliet overhead valve engine used on Alpine coach and 6½-ton truck typify tendency toward unification



Peugeot 2½-ton truck engine (cross shaft drives magneto and air pump, longitudinal shaft generator and water pump)

Passenger Car Features Incorporated Into French Commercial Vehicles

Unification of design by individual makers is a feature of the Paris Truck Show. Trucks, tractors, taxicabs, accessories, motor coaches, machine tools and wireless apparatus included at show.

By W. F. Bradley

PARIS opened its second automobile show of the season Oct. 22 in the Grand Palais, with an exhibition of trucks, motor coaches, taxicabs, stationary engines, as well as a section for machine tools, accessories and wireless. An interval of ten days separated this from the passenger car show, and the same general decorations were made use of, only the overhead signs bearing the exhibitors' name being changed.

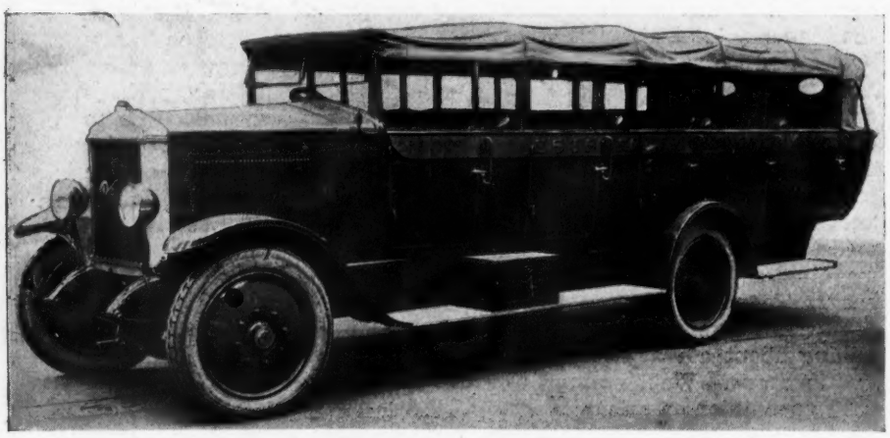
The exhibition is almost entirely French, there being no Britishers, only two Italians—Fiat and Spa—with the United States represented by dealers for Pierce-Arrow and Liberty.* The total list indicates that there are 250 exhibitors, but not more than 50 of these are showing trucks or tractors, the rest being accessory makers and dealers.

Express delivery wagons having a useful load capacity from 500 to 3000 lb. are the biggest single class of vehicles in the show. These are applied to a wide range of trades and professions, and are as plentiful for country as for town use. The type of vehicle which is most popular among French farmers is one with a load capacity of not more than 2000 lb., having a platform body with movable sides and a movable top, thus capable of being utilized for a wide range of work.

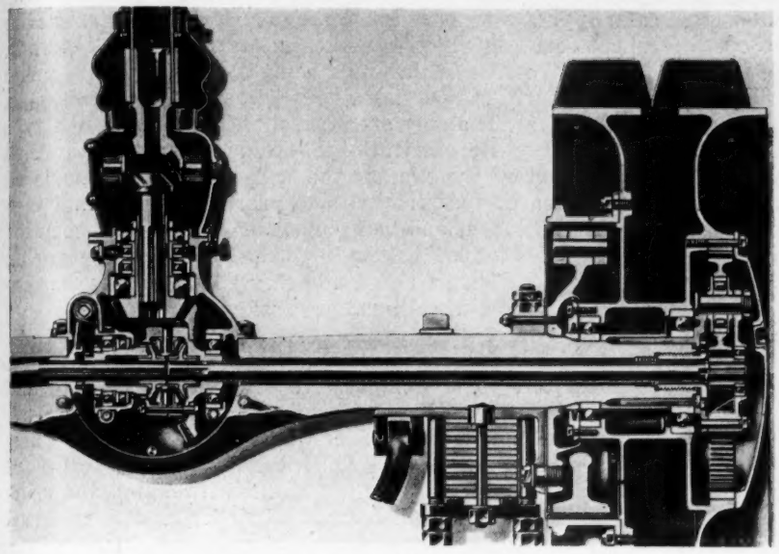
Practically all the express wagons up to 3000 lb. capacity have a passenger car chassis with no other changes than the reduction of the final gear ratio. A feature of the technical development is the growing uniformity of design throughout automobile construction, many of the leading makers now having the same general lines of construction for the smallest passenger car to a 3-ton truck, the only difference being in the nature of the final drive.

There is a good example of this in a new 5500-lb. express delivery chassis or omnibus produced by Peugeot. The

*Evidently trucks left in France by the U. S. Army.—Editor.



Berliet pneumatic tired Alpine coach with four-wheel and transmission brakes



Renault 7-ton truck rear axle with final reduction by internal gears in the drive wheels

four-cylinder 183-cu. in. L-head engine has the crankcase webs extended up to the frame members, an aluminum cover over the cylinder head to inclose the spark plugs, cross shaft for magneto and tire pump drive and fore and aft mounting for electric generator and water pump, and forms a unit powerplant with the plate clutch and four-speed gearbox. The only important point of difference between this and the passenger car chassis is that in the truck engine the aluminum crankcase lower half is in two parts, the bottom part being an oil reservoir only, and the upper of the two parts being removable to permit of rods and pistons being taken out from below. An I-section rear axle is used, with the drive shaft carried through it and differential housing bolted on its rear face. From this the power is transmitted by transverse shafts to internal gears in the road wheels. Front wheel and transmission brakes are operated together by pedal, while rear wheel brakes have hand operation.

Unification of Design

There is another example in the new Unic pneumatic-tired 2½-tonner, which has the same four-cylinder L-head engine as the passenger car, with a governor fitted and cast iron in place of aluminum pistons. Clutch, gearbox, front axle and front brakes are the same, while the rear axle is a double reduction type and rear springs are semi-elliptics instead of cantilever.

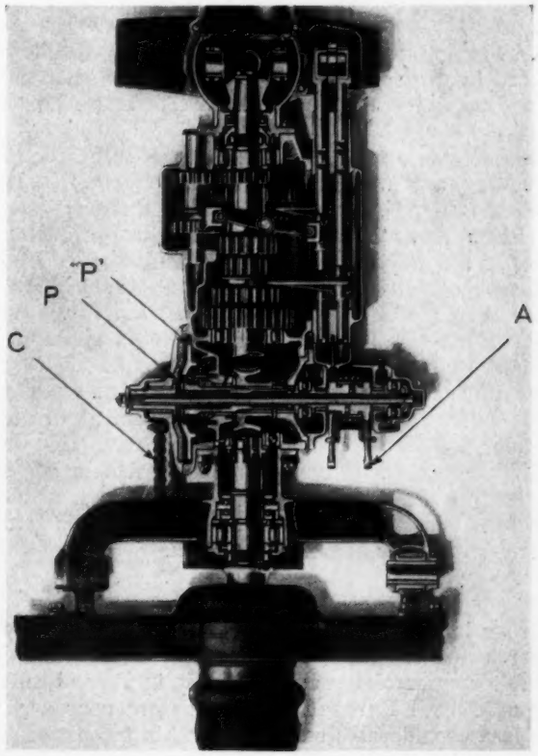
Berliet has two new chassis which are also typical of this tendency toward unification of design. The pneumatic-tired chassis designed for a 2½-ton load or for motor coach work, and the 6½-ton solid-tired truck have the same four-cylinder 4.3 by 5.5-in. overhead-valve engine, with camshaft in the base chamber and inclosed pushrod operation, a cross shaft for water pump and magneto drive and governor on the throttle. The engine and inclosed clutch form a unit, with three points of attachment, while the four-speed gearbox is attached by four points to a couple of cross frame members. An open shaft with a pair of triple fabric universals takes the drive to the rear axle. In the case of the big truck an overhead worm drive is employed, while the coach has a pressed steel banjo type axle housing with double reduction gears.

Four-cylinder engines are being used exclusively for truck or coach service. As in passenger car service the tendency is toward the overhead-valve type of engine, in all cases with pushrod operation. Even for the big units there is a certain tendency toward unit construction of engine and gearbox, but in this matter designers are moving cautiously and frequently adopt unit construction up to 2 tons' load capacity and beyond this favor separate units.

Final drive by side chains is fast disappearing, but no uniform type of drive is replacing it. Saurer is the only one having a single reduction live axle for a truck with a load capacity of more than 5 tons, the ratio on this firm's biggest vehicles being 8 to 1. Panhard-Levassor has a single reduction axle for pneumatic-tired trucks up to 3 tons' capacity. Internal-gear drive is very limited in its application, having been abandoned in many cases for the double reduction type. Renault is using planetary gears in the rear wheel hubs for his biggest trucks and double reduction for the others.

The use of front-wheel brakes has increased considerably, due to passenger car influence and also to the number of motor coaches operating over good roads in the Alps and other mountain regions. One hundred per cent of the big coaches are equipped with front-wheel brakes, all of the mechanical variety. The only example of a compressed air brake is on an Italian Spa chassis, where there is double control for the rear-wheel brakes, one of these being direct by lever and the other by air.

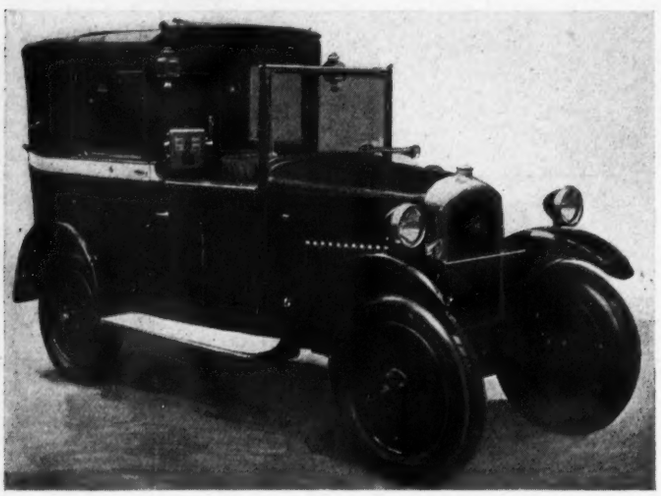
For commercial vehicle service there is a much greater tendency to connect front-wheel and transmission brakes to the pedal, and to have separate operation by lever for the rear-wheel set. This is contrary to passenger car practice, where front and rear brakes are generally operated simultaneously. Although the need is greater, there is a lesser use of servo mechanisms than on pas-



Renault gearbox mounted on front end of torque tube, with servo mechanism for brakes (P', driving disk; P, disk carried along by P'; C, chain connection to brake equalizer; A, hand lever for servo brake)

senger cars. Renault, who is fitting Perrot front-wheel brakes on his entire line, uses a friction type servo operative in both directions for all his vehicles with the exception of two light express wagons. In some cases motor coach chassis are fitted with two brake pedals, an example being the Cottin-Desgouttes, where there is a foot brake on the transmission, a foot brake on the four wheels and a hand brake on a separate set of shoes in the rear wheels. Saurer fits front-wheel brakes on his chassis mounted on pneumatic tires for passenger service, but with solid tires for truck service front brakes are not used. In both cases the Saurer engine brake is employed.

It appears certain that front brakes will become general on all types of commercial vehicles, a factor in favor of this movement being the extended use of pneumatic tires for all passenger-carrying vehicles without exception, and generally for all trucks up to 3½ and 4-ton loads. Clincher beads are the usual equipment, with single tires on the front wheels and duals on the rear. The straightside, introduced by Dunlop, Bergougnan and Goodyear, is beginning to make its appearance as a competitor to the soft bead type.



Peugeot single passenger taxicab with balloon tires

Charcoal gas and electricity as substitutes for gasoline have not yet met with a very great measure of commercial success. Under the impulse given by the army and technical difficulties attending the use of gas-producer plants on trucks have been solved, but manufacturers state that the public demand is not strong, and that it is less in France than in the Colonies. Renault has in regular production a creeper band tractor running on charcoal gas, but many of the other makers having obtained very good results in public test admit that they have made no sale outside military circles. The recent revival in electrics, for which the State authorities were responsible, has not yet had time to become commercialized. Among big makers Renault, Berliet and De Dion Bouton are preparing for business in this field. The gas-electric truck is limited to one firm with a very small production.

Citroen Creeper Track Machine

Citroen is making a very wide application of his rubber creeper track machine, and appears to be having considerable commercial success with it in Poland and other parts of central Europe where roads are poor and where there is a considerable snow fall. This machine is shown with a special grass cutter and roller attached for use on golf links, in which class of work it has distinctive advantages over wheel and metal creeper band machines. Other applications of this principle are to a fire engine and to passenger cars for the regular Trans-Sahara service about to begin. Peugeot exhibits a creeper track chassis, the construction of the track being a combination of metal and rubber. It does not appear, however, that this is in production. The only six-wheeler in the show is the type developed by Renault for sight-seeing service in Northern Africa and on the edge of the Sahara desert. This is an application of two live axles to practically a normal type chassis, the front end being unchanged with the exception of the addition of a winding drum between the spring hangers. Although not exhibiting, Goodyear is demonstrating its six-wheel bus.

Latil Four-Wheel Drive Tractor

After two years' comparative tests in agricultural and forest work, Latil has brought out an all-purpose short-wheelbase tractor with four-wheel drive and four-wheel steering. Weighing 4000 lb., it has a normal type L-head 3.3 by 5.1-in. engine, forming a unit with clutch and gearbox, semi-elliptic springs front and rear, and is equipped with steel disk wheels and 6-in. pneumatic tires. The feature of this tractor is the use of three sets of interchangeable wheels in normal steel disk wheels with pneumatic tires for road haulage; all metal tractor wheels with spuds, and a combination steel disk wheel fitted with pneumatic tires and spuds, these latter so designed that they partially encircle the pneumatic tire and are in contact with the road surface, or can individually be hinged back so that they are at right angles to the disk and free of the road. A short crowbar is the only tool required to put the spuds in either position, and the operation takes about two minutes per wheel. The tractor has a six-speed gearbox, an engine-driven pulley for a belt and brakes on all four wheels.

With this combination pneumatic-tired and spud wheel the tractor can be used alternatively on the road and across country without any loss of time.

Peugeot has produced a single-seater narrow-track taxicab fitted with a four-cylinder 42-cu. in. engine, having worm-drive axle and balloon tires. A fleet of one-passenger taxis is now operating in Paris, but this is a private venture in which the stock Peugeot is used with a special body. The new cab has been designed to give the biggest possible doors and the maximum amount of leg room for the passenger. Balloon tires and electric lighting are new features, and the body is built up of wood and sheet metal with fabric leather covering. The only other use of fabric leather is on very light delivery vans built on what are practically passenger car chassis.

CONSIDERATION has been given in Paris recently to a proposition to entirely replace the underground trolley systems by motor buses, but it is not likely that the project will go through, owing to the high cost involved and the delicate financial position of the operating company. When electric traction was first installed in Paris, it was insisted upon that all lines within the city proper be built on the underground trolley system, whereas the overhead trolley might be used in outlying districts temporarily. The objections of the Parisians to the overhead trolley systems is based on aesthetic grounds. Now the underground construction of the system requires renewal, at a cost of about $24 per foot, which is staggering, in view of the finances of the Société des Transports en Commun; the motor bus project calls for an equal if not a greater outlay, and the Prefect of the Seine, who has investigated the different projects, has reached the conclusion that the only feasible plan is to adopt overhead trolleys, the objections to which, he believes, can be overcome by suitable design.

Sweeping Changes Made in New Six Cylinder Mercedes

All six cylinders and top half of crankcase made of a single aluminum casting. Detachable cylinder heads contain valves operated from overhead camshaft. Root type supercharger used.

By P. M. Heldt

THE new six-cylinder Mercedes car with supercharged engine is an entirely new design, differing widely from former Mercedes practice. This is probably due to the fact that Herr Porsche, who was formerly with the Austrian Daimler Company, is now chief engineer of the German Daimler Company and is responsible for the new design. This new six-cylinder engine is built in two sizes, of 4 and 6 liters displacement respectively (244 and 366 cu. in.). These engines have a triple rating, that of the smaller one being 16-75-100 and that of the larger 24-100-140 hp. In these ratings the first figure represents the German tax horsepower, the second the maximum brake horsepower without, and the third the maximum brake horsepower with the supercharger. Except for dimensions of parts the design of the two chassis is the same.

One of the most interesting features of the new engines, which, as already indicated, are of the supercharger type, is that all of the six cylinders and the top half of the crankcase are a single casting of aluminum alloy. The cylinder heads, which are detachable, contain the valves, which latter are operating from an overhead camshaft. The heads are in the form of a single iron casting, which forms a sort of trough in which the valves and valve springs are located, this valve chamber being closed by a cast aluminum cover. The lower half of the crank chamber or oil pan also is an aluminum casting.

The cylinders are fitted with cast iron liners and the pistons are of the composite type, with aluminum alloy head and bosses and cast iron skirts. Thus the wear due to piston motion comes entirely on cast iron surfaces, while the weight of both the structural and the moving parts is materially reduced by the extensive use of aluminum.

Fuel is carried in a rear tank and is fed to the carbureter through a Pallas vacuum system. Air for the carbureter is taken in through a heating muff on the exhaust pipe and carried to the carbureter on the opposite side through a passage between the fourth and fifth cylinders. The carbureter is a special Mercedes design of the concentric float type and has the peculiarity that it operates both under suction and under pressure (when the supercharger is in operation).

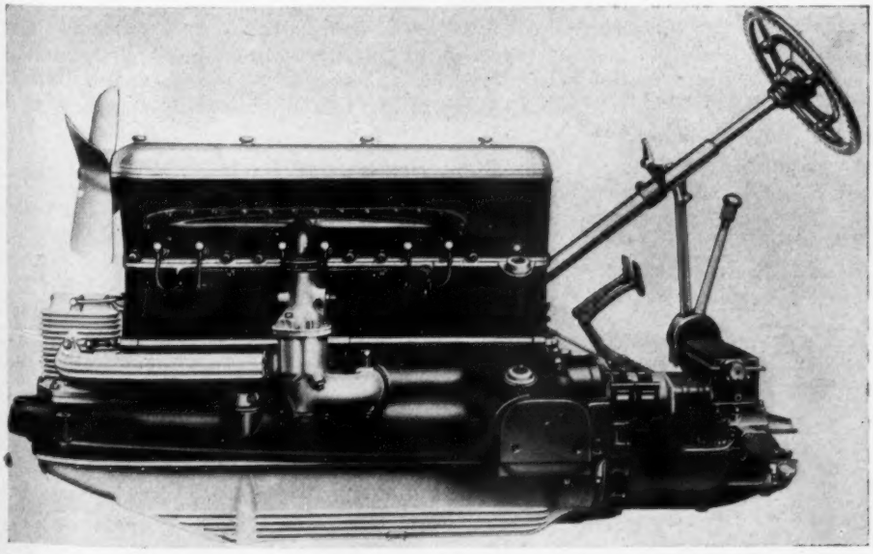
Camshaft Drive

The overhead camshaft is driven from the rear end of the crankshaft through a vertical shaft with helical gears at both top and bottom. The valves are arranged vertically in the head in two rows and are operated from the cams through the intermediary of short single arm levers. The cast aluminum fan is arranged co-axially with the camshaft and is driven from it through a springy shaft which takes care of inertia stresses in case of sudden accelerations and decelerations of the engine.

Ignition is by a Robert Bosch high tension magneto which, together with the generator and water pump, is located under a housing on the right side of the engine. These accessories are mounted on arc-shaped saddles and held in position by means of steel traps and clamping bolts, so they can be readily removed and replaced. They are driven from the engine crankshaft at the rear.

An interesting feature in connection with the inclosure of the accessories is the provision of a lubrication indicator in the cover which gives visible indication of the amount of grease remaining in the grease cup of the water pump bearing. There is a small window in the cover, behind which there is a rectangular disk which is connected up with the piston of the compression grease cup in such a manner that it swings across the window as the grease cup empties. The rectangle is divided by a diagonal line into two triangles, one of which is painted red and the other white. When the grease cup is full, white shows behind the window in the cover, and when it is empty, red (the danger signal) shows.

The supercharger is mounted at the forward end of the engine. It is of the



Carbureter side of Mercedes 24/100/140 hp. powerplant

Root blower type and is driven from the crankshaft through a friction clutch which is engaged by means of the accelerator pedal. Ordinarily this clutch is disengaged, and pressing on the accelerator pedal merely results in a further opening of the throttle valve. When the throttle is fully open and the accelerator pedal is depressed still farther, the supercharger compressor is set in motion and the engine receives a materially heavier charge and develops correspondingly increased power. The supercharger takes in its air through the housing of the accessories, which is open at the bottom. As will be noticed from the illustration, the supercharger housing is lightly ribbed for cooling purposes.

Pressure Lubrication Has No Relief Valve

Lubrication is by pressure to all of the engine bearings. There is no pressure relief valve on the system and the pressure acting on the oil increases substantially in proportion to the engine speed. An electrically operated indicator on the instrument board shows a red light when the engine is running and the oil pump for any reason does not produce pressure in the lubricating circuit.

A combination oil gage and drain valve is located on the crankcase directly forward of the carbureter. This can be turned by means of a handle and has four positions. Normally it is in the closed position. When turned to the left it first gets to the high level position. If oil drains off while the handle is in this position, there is too much in the crankcase. When turned still further to the left the handle gets into the low level position, and if no oil drains off while the valve is in this position there is too little oil in the case. Finally, to drain off all oil from the case the valve is turned to the extreme position to the right.

In the Mercedes engine the supply of oil in the crankcase is constantly replenished automatically as oil is consumed. To this end a fresh oil tank of 1½-gal. capacity is cast in the crankcase at the rear end on the left-hand side. This tank is filled through a filler hole on the side of the cylinder block and directly above this filler there is a gage working on substantially the same principle as the indicator on the pump bearing grease cup; that is, it shows white behind a glass when the tank is full and the color changes gradually to red as the tank empties.

Fresh oil is constantly added to the crankcase supply by a small pump built integral with the pressure pump. The cylinder head, as already pointed out, is in the form of a trough, and if oil is to be added to the crankcase supply to bring up the level it is simply poured into this trough after the valve cover has been removed.

Unit Powerplant Used

The clutch is of the dry disk type and is inclosed in a bell housing, the engine and transmission being combined in a unit powerplant, which is a new departure for Mercedes. The electric starter has a saddle mounting on the transmission case and drives to the engine flywheel by magnetic shift. Also mounted on the transmission case is a small air pump for tire inflation. The transmission gives four forward speeds and reverse and is controlled by a short and rigid lever shifting on a quadrant.

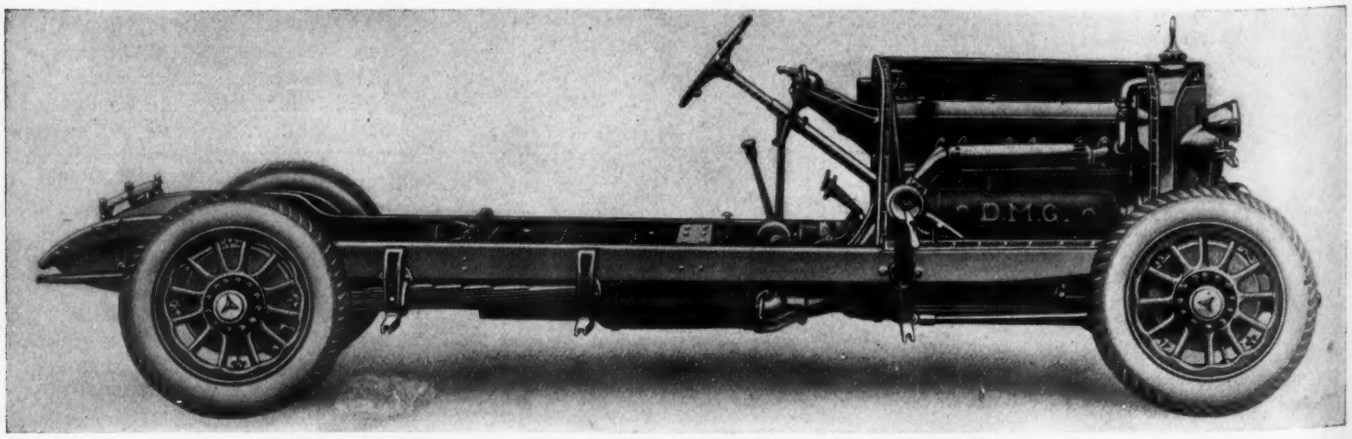
A combination lock is provided on the gear shift, by means of which it can be locked in either the neutral or the reverse position. Near the handle of the shift lever there are three rings with numerals, and each car sent out is set for a different combination. The speedometer drive is taken from the transmission and at the rear of the transmission is a spherical support for the forward end of the propeller shaft housing, inside of which is located the universal joint at the forward end of the propeller shaft, which is of the square sliding block type.

The rear axle housing is a steel casting, but has the form of the conventional pressed steel housing with the joint in the vertical plane. There is an aluminum gear carrier and an aluminum rear cover. The axle is of the full floating type and there are short diagonal braces between the axle housings and the propeller shaft housing, which latter is of trumpet form.

Six Brakes Provided

Four-wheel brakes are fitted and are operated by a pedal through an equalizing device located under the frame cross member directly back of the transmission housing. There is a second set of brakes on the rear wheels, which is operated by hand. All brakes are of the internal type and the two sets on the rear wheels are located side by side inside the same brake drums, which latter are provided with cooling ribs. Adjustment of both sets of brakes can be made by means of hand wheels with knurled edges, located under the front seat footboard. Connection to the brakes is made by means of steel cables of comparatively large size (⅜ in.). An additional adjustment for the rear brakes is provided at the connection of the cable to the left-hand brakes.

At the center of the frame on opposite sides of the propeller shaft are arranged two pressed steel boxes. One of these is intended for tools and spare parts and the other for the storage battery and for tire repair



Mercedes six-cylinder chassis with new aluminum engine and supercharger

necessities, including the jack. The compartment for all the equipment necessary in making tire repairs is located at the forward end and opens toward the outside, so that passengers need not be disturbed and floorboards raised when it becomes necessary to make a tire repair. A number of wooden chests are provided for the various tools, in which there is a depression for each tool, so that if one is missing it can be seen at once.

Concentric with the steering wheel there is a wheel rim of smaller diameter which is used for sounding the horn and for turning the lights on and off while driving. Pressing on this rim sounds the horn, while pulling on it at any point puts on the lights. The dials of various instruments on the dash, such as the speedometer, as illuminated at night by small electric bulbs mounted at the center of the glass over the dials and covered by a shade to protect the driver's eyes against glare from them. The whole instrument board, moreover, can be illuminated by a dashlight of the protected type, the cover on which can be turned so as to project the beam of light in any direction over the instrument board. This lamp is fastened to a 25-ft. cord wound over a reel, and by pulling on the lamp it can be carried to any part of the car. While thus extended there is no pull on the cord, but upon turning off the light at the socket the cord automatically winds up again.

Changes Made in the New Series Maxwell Cars

IMPROVED hood lines and detail changes in the engine which have resulted in a 10 per cent increase in its power output, are the outstanding features of the new series Maxwell. Balloon tires are now regular factory equipment, the size being 30 x 5.25 in. on all models except the standard sedan, which is fitted with 30 x 5.77 in. tires. Duco finish is being used on all models. Prices remain the same with the exception of the standard sedan, which now lists at $1,345 instead of $1,325.

The engine changes are in the cylinder block, valves and pistons. The height of the block has been increased and the water jacketing has been redesigned to secure freer circulation. All valve seats and exhaust ports are now entirely surrounded by water. Nos. 2 and 3 exhaust ports, which were formerly siamesed, are separate in the new block. The valve diameter has been increased by 3/32 in. and the seat angle has been changed from 30 to 45 deg. The increased output of the engine is attributed to these changes. Piston length has been increased by ⅜ in. and the bearing surface of the skirt has been increased by 17/32 in. The added bearing area is all located above the piston pin. The pistons now are reinforced by a bottom flange.

Easier Steering Provided

Easier steering has been secured by the adoption of ball thrust bearings at the pivots, by increasing the steering gear reduction from 7½ to 9½ and by giving the king pins a slight tranverse inclination so that their prolonged axis meets the road surface close to the center of tire contact. The transverse drag link formerly used has been replaced by the more conventional fore-and-aft design. The steering wheel has been enlarged and the spark and throttle controls are of the short lever type located on the top of the steering column.

The radiator contour has been improved by increasing the width of the shell slightly at the top. The fender width has been increased by an inch and the skirts are deeper. To accentuate the appearance of the length, the running boards are 1½ in. lower and the splash apron has been deepened proportionately. This change has not, however, reduced the road clearance. The appearance of the headlamps has also been improved. The instruments are now grouped in an oval panel formed by a bead molding pressed into instrument board. In the open models, blue leather has replaced black and the standard sedan is done in tan and blue striped velour. The belt line molding on the latter model has been changed so that all windows are now the same height and a triple belt line stripe of gold and red has been added. The closed models all have integral sun visors and one-piece windshields. Natural wood wheels are regular equipment on all models.

Jack Operated from Driver's Seat

A POWER-OPERATED hydraulic jack by means of which any wheel of an automobile can be raised off the ground, or all of the wheels simultaneously, has been developed by the United Foundry & Machine Co., McDonald, Pa. The equipment really comprises four jacks, of which one is clamped to each end of each axle. These jacks are connected to an oil pump which can be thrown into and out of gear with the engine in some convenient way. A drawing issued by the manufacturers shows it driven by a friction wheel from the flywheel. An operating board with eight valves is located on the kneeboard of the car, there being one pipe line to the top and one to the bottom of each jack cylinder. By opening two valves and depressing the operating pedal by means of which the pump is placed in driving connection with the engine, any one wheel can be quickly raised off the ground while the driver is in his seat. The cylinder of the jack is fastened to the axle or axle housing and the ram extends downward.

Among the advantages claimed for this jack, known as the Nordenskjold jack, is its convenience in changing tires, putting on non-skid chains and raising the car off the ground in parking or garaging. The weight of the outfit is given as 60 lb.

Population's Purchasing Power

THE Domestic Distribution Department of the United States Chamber of Commerce has issued a pamphlet entitled "Population's Purchasing Power." The principal part is given over to analyses of the populations of 31 centers of distribution, together with summaries of all the figures. "Age, sex, nativity, color and occupation are defined for each city as well as the territory surrounding it. . . . These figures are the fundamental elements of any investigation related to sales possibilities and sales quotas."

Expenditures are listed under five heads—food, clothing, furniture and housefurnishings, fuel and light and miscellaneous—and the methods for determining whether the dealer is securing his proportion of the trade in his city is outlined.

This pamphlet may be obtained from the manager of the Domestic Distribution Department of the U. S. Chamber of Commerce in Washington on request.

Latest Wisconsin Six Designed to Meet Exacting Demands of Bus Service

New engine of 4½ in. bore and 5 in. stroke develops 105 hp. at 2400 r.p.m. Overhead valves are operated from camshaft in crankcase. Drive for compressor and large generator provided.

By W. L. Carver

WITH the demands of bus service in mind the latest Wisconsin six-cylinder engine has been designed with provisions for an oversize electric generator, an air compressor, magneto ignition and an inertia governor. This engine, termed type Z, has a bore of 4½ in. and stroke of 5 in., the displacement being 477 cu. in. Overhead valves operated from a camshaft located in the crankcase are used. The power curve peaks at 105 hp. at 2400 r.p.m. Torque at low speeds is high, while 53 hp. is developed at 1000 r.p.m., 77 hp. at 1500 r.p.m. and 95 hp. at 2000 r.p.m.

The compression ratio is moderate and the makers state that detonation will not occur with ordinary fuels. In conformity with the established practice of the Wisconsin Motor Manufacturing Co., the crankshaft is carried in four main bearings and oil is fed under full pressure to all bearings on this shaft.

Crankcase, bottom pan and cylinder head cover are aluminum castings, and the cylinder block, timing gear cover, cylinder head and detachable bell housing are iron castings. The crankcase is parted 2¾ in. below the centerline of the crankshaft and is supported at two points on the S. A. E. No. 3 bell housing and at a barrel mounting on the timing gear cover. When required, this engine will be produced in the open flywheel type with provisions for cross beam support at the rear end.

All main crankshaft bearings measure 2¾ in. diameter by 3 in. long. Crankpin bearings are 2¾ in. diameter and 2½ in. long. All bearings are the full surface bronze back babbitt lined type. The crankshaft is forged from S. A. E. 1045 steel and connecting rods are S. A. E. 1035 steel, all heat-treated.

Rod and Piston Design

Center to center length of the connecting rods is 10½ in. and the lower cap is secured by four bolts. The upper end has a bronze bushing of 3/16 in. inside diameter. Flat head cast iron pistons have three ⅛-in. and one 3/16-in. wide rings above the pin. The bearing surface is evenly distributed above and below the piston pin. The three upper rings are of the perfect circle type while the lower and wider one is the slotted oil type, made by the Indiana Piston Ring Co. In conjunction with this ring the lower groove is drilled to provide oil relief holes. The pin is prevented from rotating by a Woodruff key in one piston boss, and snap rings seated in the outer ends of the bearings retain the pin endwise.

Four bronze bearings, ranging from 1¾ in. diameter at the rear to 2 1/16 in. diameter at the front, carry the camshaft, which is driven by a cast iron gear. An idler gear of Bakelite meshes with the steel pinion on the front end of the crankshaft and with a steel pinion on the accessory shaft. The water and oil pumps, magneto and battery ignition head are driven from this shaft.

At the right side of the engine the camshaft gear drives a composition pinion on the generator shaft and below this is located another pinion of similar material which drives through a long shaft an air compressor located back of the middle of the engine. All gears in the train are 1½ in. face with helical teeth and arranged so that no two metallic gears mesh.

Cylinders are cast en bloc with liberal water space around each barrel. Roller type tappets are carried in three die-cast plates which bolt onto a machined surface on the left side of the cylinder block. Four tappets are carried in each plate. The tappets are restrained from rotation by slots in which the rollers fit and are prevented from dropping through during assembly by snap rings near the tops of their drilled barrels.

Valves in Flat Detachable Head

A 20-in. diameter cooling fan is mounted on an adjustable arm which is supported at a boss on the front of the cylinder casting. Combustion spaces are machined in cylindrical shape in the cylinder head casting with the valves located in the flat head at the top. Both intake and exhaust valves are 2 1/16 in. diameter in the clear and have chrome-silicon steel heads.

Valves are operated by overhead rocker arms and push rods, the former being arranged so that the lift of the cam is somewhat less than that of the valve. The intake valve opens 5 deg. late and closes 60 deg. late, while the exhaust valve opens 45 deg. early and closes 5 deg. late.

Spark plugs are set at an angle at the right side of the head. Their bosses, like the valve seats, are provided with ample water space clear around. As the water pump connection to the cylinder block and the water outlet in the cylinder head both are located near the front of the engine, the passages between the block and the head are graduated to allow even distribution and even temperature throughout the entire length.

A combination intake and exhaust manifold bolts onto the left side of the cylinder head. There are six individual exhaust ports and, while the intake portion of the manifold connects with the head at two points, the coring of the latter is arranged to form six individual intake ports. This core is branched and extends from the front to the rear intake valve pocket, so that excellent distribution is obtained, the gas having approximately the same distance to travel to any cylinder and the same number and magnitude of bends. The manifold is flanged to carry a standard 1¾-in. carbureter and is arranged with a hot spot at the top of the riser section.

When desired, a K-P governor can be interposed between the carbureter and intake manifold flange. This is an inertia type of governor which the Wisconsin engineers have found to be very accurate in regulation and

simple. The cylinder head cover is held down by two eye-nuts which can be used to lift the entire engine.

The oil pump is bolted to the under side of an extension of the bottom face of the crankcase and is driven by helical gears and a vertical shaft from the accessory shaft at the right side of the engine. No external tubing is used for the oil line, as connections are drilled at the mounting surface. Inside the crankcase heavy copper tube connections extend to the interior of the cylindrical oil screen under the center of the false bottom of the crankcase pan and also to the end of a header which supplies the main bearings. This header is a supply tube which runs the length of the engine. To it are attached shorter sections which connect with each of the main bearings. This assembly is welded together and then set into the mold before the aluminum for the crankcase is poured.

A vertical tube passing through the pushrod enclosure joins the hollow rocker shaft with the main oil line and a connection is made at the rear end to a pressure regulator and overflow valve which is bolted on the outside of the crankcase. Oil pressure is regulated to 10 lb. per sq. in. at low speeds and 30 lb. at open throttle positions.

Drive gears for the pump are located in a barrel extension of the aluminum crankcase. If desired, the oil pump shaft also drives a distributor head at its upper end, the mounting surface for this head being flush with the top surface of the crankcase. A centrifugal water pump is bolted to the back face of the barrel extension and the drive shaft extends through the pump to drive the magneto which is carried on a shelf cast on the side of the crankcase.

At the opposite side of the engine the generator is flange mounted on the back of the timing gear case and provision is made for a support bracket at the rear of this unit. Special attention has been paid to the demands of bus lighting. Space is allowed for the installation of a generator of 6½ in. diameter and 12 in. long. The flange mounting is S. A. E. No. 2 and the generator is driven at 1½ times crankshaft speed.

Compressor Mounting Provided

A Westinghouse two-cylinder air compressor can be mounted on a plate which bolts to the under side of the bottom flange of the crankcase. The center of the compressor is 8½ in. back of the center of the engine and the drive from the front end is through a long shaft fitted with universal couplings at both ends. The compressor runs at 5/7 engine speed. The starting motor is mounted on the bell housing on the magneto side of the engine, an S. A. E. No. 2 flange being provided.

Width of the engine over the starting motor is such that a steering gear can be placed alongside in the average bus chassis. On the opposite side for right-hand drive, the clearance at the air compressor is ample. The fan is belt-driven from a pulley on the front end of the accessory shaft.

Easy Polishing Is Feature of New Lacquer Finish

FURTHER interest of the varnish manufacturing trade in pyroxylin finishes is indicated by the announcement that Pratt & Lambert, Inc., of Buffalo, N. Y., well known as manufacturers of automobile finishing materials, will produce and market a new line of nitrocellulose finishes under the name Prodium.

Merits claimed for the new finish lie in ease of application, comparative freedom from a pebbly surface and ease of polishing, rather than in any radical qualities of the materials themselves. Prodium primer and surfacer are made on a varnish base rather than on a lacquer base, because of the belief of the makers that varnish base coatings adhere to the metal better and are less likely to peel than pyroxylin undercoats, although it is considered likely that the latter some time will be developed and see quite general use.

Prodium lacquer enamel is reported to yield about the same degree of gloss as other lacquer finishes. Experiments with various methods for increasing gloss are asserted to have shown that an excess of gums decreases elasticity and durability, while if oil is present in sufficient quantity to influence gloss, drying is retarded and a softer film obtained. Reducing the pigment content and increasing the proportion of clear lacquer also may increase gloss, but at the expense of more rapid deterioration due to the action of sunlight.

In consequence of these conditions an effort has been made to produce an enamel which can be polished with minimum labor.

Six coats, exclusive of putty glaze, including primer, surfacer, second surfacer and three of lacquer enamel are used in the standard Prodium system. All of the materials used in these coats carry the name Prodium, but the primer, surfacer and putty glaze are similar to the corresponding products used in varnish finishes.

The primer is an iron oxide product and can be baked one-half hour at 300 deg. Fahr. or force dried at 160 deg. for four hours. This coat should not be sanded, as an unbroken film is desired. Each coat of surfacer, as well as the putty glaze if needed, is baked for one hour at 300 deg. Fahr. or force dried three hours at 160 deg. The putty glaze is dry sanded and the second coat of surfacer is wet sanded with 5-0 or 6-0 paper, taking care not to cut through the primer, after which the job is dried out by baking one hour at 300 deg. or force drying one and one-half hours at 160 deg.

Three coats of Prodium lacquer enamel are recommended and these are air dried one hour between coats. None of these coats are sanded unless a high gloss is desired, in which event polishing is done with Prodium polish, the use of which is said to require much less work than pumice or rotten stone.

With the schedule outlined a job can be completed in two days with no sacrifice in durability due to excess speed.

Prodium is being manufactured in a plant built especially for this purpose adjacent to the main plant of the company in Buffalo.

SHIPMENTS of rubber in liquid form from the plantations in the Far East to this country have been steadily increasing for more than a year, and four lines of steamers are now equipped to carry cargoes of latex in their ballast and oil tanks. When the ships arrive at an American port, the latex is pumped into tank cars of the sort commonly used for the transportation of petroleum. A barge carries the tank cars alongside the ship. Practically the entire production of the plantations of the United States Rubber Company in Sumatra and the Malay Peninsula is now shipped here as latex or in the form of "sprayed rubber."

Double-deck bus which the Department of Street Railways of Detroit has recommended that the City Council purchase from the Yellow Coach Mfg. Co.

Detroit to Purchase 50 Double-Deck 61-Passenger Motorbuses

City Council advised to buy six-cylinder Yellow Coach chassis with 230 in. wheelbase, pneumatic tires and air brakes. Is designed for one or two-man operation.

PURCHASE of 50 double-deck, 61-passenger motorbuses from the Yellow Coach Mfg. Co., Chicago, has been recommended to the Detroit City Council by the Department of Street Railways. The specifications provide for a six-cylinder, 230-in. wheelbase chassis which, complete with body, shall not weigh more than 14,000 lb. and which shall be able to pass unladen under 13 ft. 1 in. viaducts. The upper deck must be roofed over and fully inclosed, and the interior must be so arranged that the bus may be operated either by one or two men. The weight of the bus without its load is to be divided between the front and rear axles on the basis of 42.4 per cent on the former and 57.6 per cent on the latter.

General dimensions specified are as follows:

Overall length of coach over bumpers,	29 ft. 6¾	in.
Overall length of body,	23 ft. 9	in.
Overall width,	7 ft. 10	in.
Overall height—loaded,	12 ft. 8	in.
Overall height—unloaded,	12 ft. 11	in.
Headroom inside body—lower deck,	6 ft. 3½	in.
upper deck	5 ft. 10	in.
entrance	6 ft. ¾	in.
over ramp	5 ft. 10	in.
Floor height from ground—loaded	21¾	in.
Height of front entrance step from ground—loaded	14	in.

Body framework is to be of second growth ash and the roof of monitor metal construction. Lower and upper deck side panels of 14-gage aluminum and front dash, rear, extension and upper deck panels of 20-gage body steel, are specified. Window sashes are to be of drawn brass and are to be equipped with anti-rattlers and weather strips. In the lower deck, the interior finish is to be polished mahogany both above and below the belt rail, including the advertising rack moldings with white ceiling and dark green linoleum floor covering.

Corrugated aluminum matting for the lower body panels below the heating system and nickeled hardware are called for. The floor of the upper deck and the lower side panels are to be in dark green, and the upper side panels, posts and inside belt rail in mahogany finish.

Deep Cushioned Seats Used

Lower deck seats face forward and are arranged on either side of a central aisle 18 in. wide. They are to have deep cushions and full spring backs upholstered in dark brown leather. Pedestals and brackets are to be of pressed steel and nickel grab handles are specified. Seat width is 34 in. and the spacing 29 in. The seats on the upper deck are to face outward. The upholstery specified is leather and the seat width between arm rests 35 in.

Driver's seat is of the bucket type and his compartment is to have cast aluminum floor boards with accelerator foot rest and hinged door for brake adjustment.

Front entrance door is to be a 27-in. mahogany, jackknife type opening inward and operated from the driver's seat. The maximum height allowed for the entrance step is 14 in. The rear door is also of the jacknife type,

opening inward. Supported directly from the chassis frame two pressed steel side members are to support a loading platform measuring 41 x 86 in. A feature of the body is the inclosed spiral stairway leading to the upper deck. It is 17 in. wide—and has seven risers. Both stringers and risers are to be of sheet steel with aluminum molding edges. Hand rails are to be of nickel tubing.

Ventilation and Windshields

Upper and lower windshields are to be of a one-piece design with the glass set in a cast aluminum frame. Ventilation is to be provided for by means of two separate panels at the top of each windshield with openings at the rear of both decks for foul air exhaust. Exhaust gas heating by means of thin wall tubing passing around both sides of the body is provided for. Exposed parts are to be covered with perforated metal guards. The upper deck is to be heated through roof ventilators in the top of the monitor. Eight 15 cp. lamps on each deck are to provide illumination. Signal buttons at each seat on both decks in addition to two provided for the conductor are specified.

Equipment specified includes dash lamps, combination tail and stoplight, barrel type headlamps with dimmers, front and rear bumpers, Hunter illuminated signs, Moto-Meter, horn, two automatic windshield wipers, oil operated jack and complete emergency tool kit.

The following general chassis dimensions are specified:

Dash to center line of rear axle,	196¼	in.
Dash to end of frame,	234	in.
Frame width—front,	38¾	in.
rear,	58¾	in.
Track—front,	74¾	in.
rear,	76¾	in.
Turning radii—left,	35 ft. 11	in.
right,	32 ft. 11	in.

The engine is to be a six-cylinder unit with 4¼-in. bore and 5½-in. stroke, developing 105 hp. at 2000 r.p.m. Crankcase and underpan are to be of aluminum and the crankshaft is to be supported in seven main bearings. Delco ignition and a Pierce governor set at 33 m.p.h. are specified. The fuel system includes Zenith carbureter and vacuum feed. North East electrical equipment consisting of a 300-watt, 12-volt generator and a starting motor with geared head type of Bendix drive are called for. The radiator is to be of the fin and tube type with polished cast aluminum shell. Ross cam and lever steering gear with 18-in. black walnut wheel is specified.

A single plate clutch cooled by induced air currents and a four-speed transmission unit mounted amidships at three points is required. The propeller shaft is to be a tubular two-piece design with Spicer universals. Frame specifications call for pressed steel side channels with kickup over front and rear axle and six cross members. The maximum side bar depth is to be 10 in. and the minimum flange width 3 to 4 in. Springs are to be progressive type, semi-elliptics, with not more than 6 in. camber, and to be flat under load. The spring dimensions specified are 48½ x 3½ in. front and 60 x 4 in. rear.

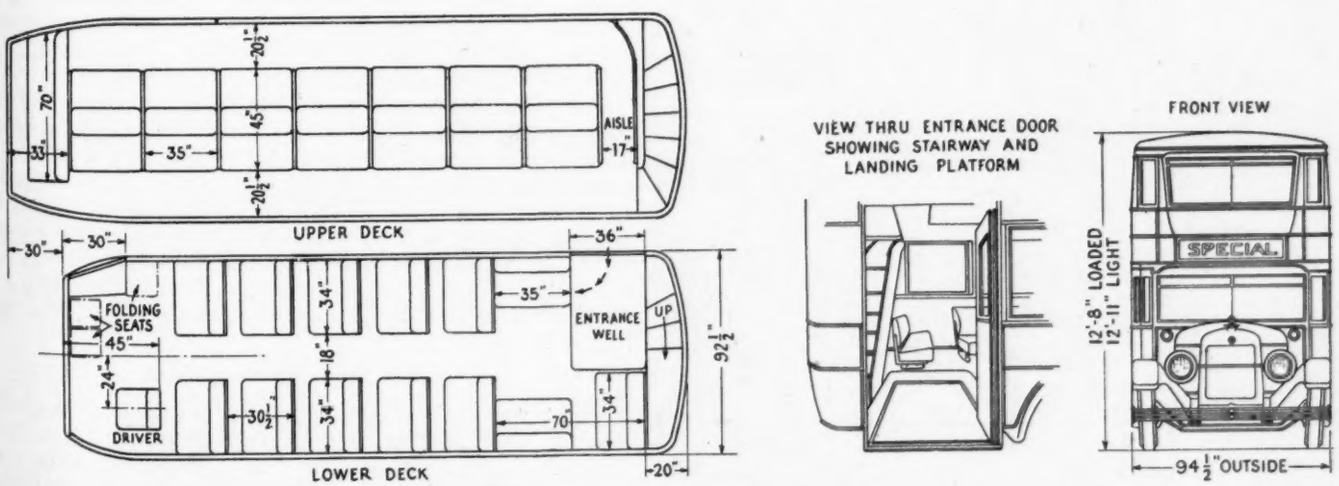
Front axle is to be a reverse Elliot Timken with ball thrust bearings and taper roller wheel bearings. An underslung worm gear rear axle with one-piece drop-forged banjo housing and integral spring pads is specified. It is to be a semi-floating type with taper roller bearings, bronze worm wheel, giving a 6 to 1 reduction. The wheels are to be of the disk type with cast steel hubs. Tires specified are 34 x 7 pneumatics, duals at the rear.

Two sets of brakes operating on the rear wheels are to be provided. Westinghouse air brakes are specified for service use. Drums are to be 21 x 5 in. and the brakes must be adjustable from the driver's seat.

Chassis equipment is to include front fenders, hoods, speedometer, oil gage, air cleaner, gasoline filter, mud pan, foot boards and extra disk wheel. Such electrical equipment as voltage regulator, cut-out, ammeter, lighting and bell circuit fuses, spare fuses, switches, generator pilot light and stoplight tell-tale also is included.

German Automobile Standardization

ACCORDING to a notice in Der Motorwagen there has been a lull in automobile standardization work in Germany for six months, but the work will be resumed shortly. There will shortly be issued standards on flat castellated nuts and union joints. New editions will be issued of standards sheets on stresses, solid rubber tires and fits. Almost completed are standards on pressure gages, piston rings for light alloy and iron pistons, rigid detachable rims for motor truck wheels with pneumatic tires, carbureter flanges and four and six spline joints. Tentative standards have been worked out for automobile nomenclature, cap nuts, ten-spline joints, joint yokes, eye ends, joint bolts, ball heads and ball studs.



Seating plans, rear entrance and front view of bus for City of Detroit

Fig. 1—Two-way drive super truck backing up to concrete mixer

New Truck Travels Forward or Backward at Equal Speeds

Transmission gear provides five gear changes. Special reverse gear in the rear axle makes travelling in either direction possible. Two seats are provided for the driver as illustrated.

HAS two seats for the driver and can be driven in both directions at the same speeds. Transmission gear provides five gear changes, all in the same direction, and reversal of motion is obtained by special reverse gear in rear axle.

In road construction work, motor trucks frequently must be driven over obstructions, through soft dirt and over rocks in order to deliver the loads where they are wanted, and then either must be turned around on a turntable or backed a long distance where the going is bad.

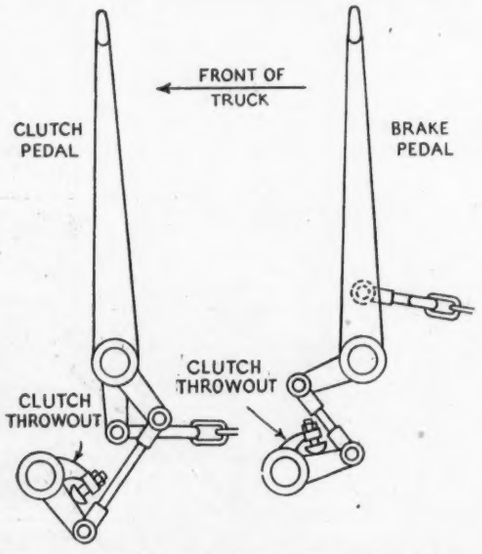


Fig. 2—Clutch and brake pedals and their connections

The two-way drive super truck, manufactured by the O'Connell Motor Truck Co. of Waukegan, Ill., is designed to overcome these difficulties experienced with the conventional truck, and a number of interesting mechanical details have been incorporated in the design to make this possible. As may be seen from the illustration of the truck at work, in addition to the conventional seat there is another one mounted out over the hood on which the driver sits when the truck is driven backward.

The clutch and brake pedals come up practically vertically through the floor boards and can be operated from both seats. When the pedal normally used for the clutch is pushed in the reverse direction it becomes the brake pedal, while the brake pedal under the same conditions becomes the clutch pedal. In this way the driver does not have to become accustomed to any different action and instinctively does the right thing.

The transmission is designed to give five speeds, all in the same direction, and reversal of motion is accomplished by a special construction in the rear axle. The lever at the side of the truck operates this reverse in the rear axle. In this way a wide range of gear changes is available for negotiating the difficult places encountered in road construction, while at the same time high speed gearing is available for use in both directions, so that time may be saved when the truck is running light or where the road is good.

Clutch and Brake Pedals

Fig. 2 shows the clutch and brake pedals as they would be seen when looking at them from the left side of the vehicle, except that they have been shown laterally displaced instead of in line with each other, in order to make the principle of operation clear. In this figure the front

of the truck is to the left, and the pedal on the left is the one normally used as the clutch pedal and operated by the driver's left foot when the truck is being driven forward. The pedal at the right is the one normally used for operating the brake.

If the brake pedal is pushed to the left it will tighten the chain which goes back to the brake cross shaft, and hence operate to set the brakes. The clutch pedal, on the other hand, if pushed forward (to the left in the sketch), will act to loosen its chain so that it will have no effect on the brake cross shaft, to which this chain is also connected.

When the driver has reversed his position and is facing the rear, he will push the brake pedal in the reverse direction, using his left foot. The chain will then be loosened and the lower member of the brake pedal linkage will act against the adjustable stop on the clutch throwout arm, thus operating the clutch. The clutch pedal, on the other hand, when operated by the driver's right foot will cause the lower member to move away from the stop on the clutch throwout arm and at the same time will tighten its chain so as to apply the brakes.

In Fig. 2 the two members marked "clutch throwout" are both integral with the shaft which in the clutch proper operates the throwout yoke. The other members of the clutch and brake assembly, however, merely have their bearing on this shaft and are free to rotate on it, so that their ability to release the clutch is in their contact with the adjustable stop on the clutch throwout.

In Fig. 3 is shown the rear axle construction which incorporates the reverse gearing. The two bevel gears shown mesh with the conventional bevel pinion. The two

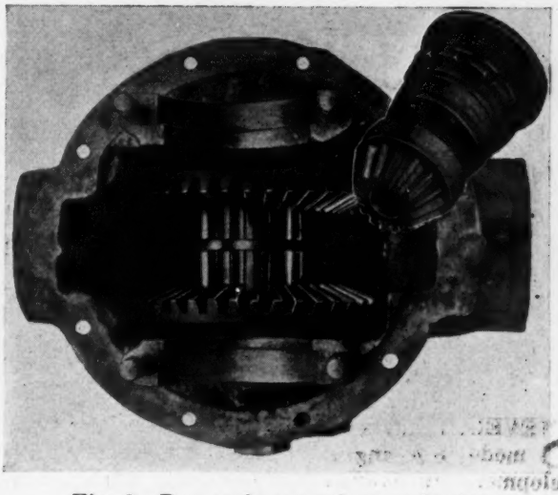


Fig. 3—Rear axle reversing mechanism

bevel gears float on bearings in the housing, and either one or the other of them drives the spur gear shown in the center of Fig. 3, this gear being shifted to one side or the other by the action of the reversing lever at the side of the driver's seat.

As the two bevel gears mesh with and are driven by the same pinion, they will rotate in opposite directions, so that the direction of rotation of the spur gear will change when it is shifted. The central portion of each bevel gear has an internal gear cut in it, into which the driven spur gear meshes.

Pneumatic Punch, Riveter and Press Developed

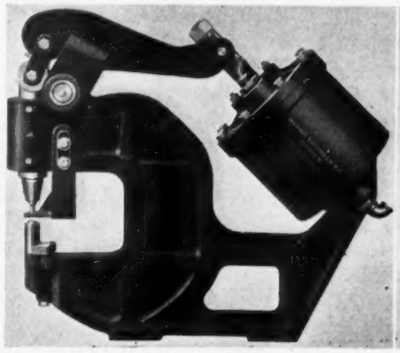
A LATE development in riveting machines is a pneumatic combination punch and riveter, manufactured by Hanna Engineering Works of Chicago. Special features claimed for this machine are a high speed of operation and wide adaptability. The machine is mounted on a bench or stand in an upright position as shown, or is cradled thereon in an inverted position. For portable use it can be suspended with dies vertical or horizontal while upright or inverted. This type of riveter is said to be widely used in the automotive field where the work is of a restrictive nature and requires a compact machine able to reach work in inaccessible corners and angles.

The cylinder is equipped with an air cushion feature at each end, to absorb the inertia of the rapidly moving piston at the ends of the stroke. This air cushion at the working end of the cylinder is essential when the machine acts as a punch. The high air pressure built up below the piston to force the punch through the work must not, when the resistance is suddenly released, be allowed to force the piston against the cylinder head at a high velocity.

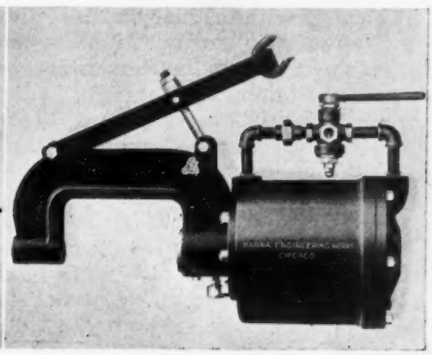
The mechanism is simple lever and toggle combination, which combines a long die stroke with a considerable zone of uniform pressure, thus eliminating the necessity of a screw adjustment on the die. The upper part of the die stroke is very rapid, while the last few inches of piston travel are made at low and uniform speed, with consequent uniform die pressure. The advantage of this is that where the work is lightest the speed is greatest, and as the rivet head forms or the punch advances into the plate the pressure increases.

The combination punch and riveter is made in three sizes of 7, 8 and 9 in. reach and 7, 7 and 8 in. gap, respectively, the rated pressure capacities being 6,10 and 15 tons.

Another addition to the Hanna line of riveting machines is the straight acting pneumatic press illustrated herewith. This machine has a reach of 4 in. and a gap of 6 in. The cylinder diameter is 12¼-in. and the machine is capable of exerting a pressure of five tons on the dies at 100 lb. per sq. in. air pressure. The die stroke is 2 in. The machine has a capacity for driving 3/16 in. cold rivets, and ¼-in. hot rivets, and weighs 225 lb.



Hanna Pneumatic Combination Punch and Riveter



Hanna Straight-Acting Pneumatic Press

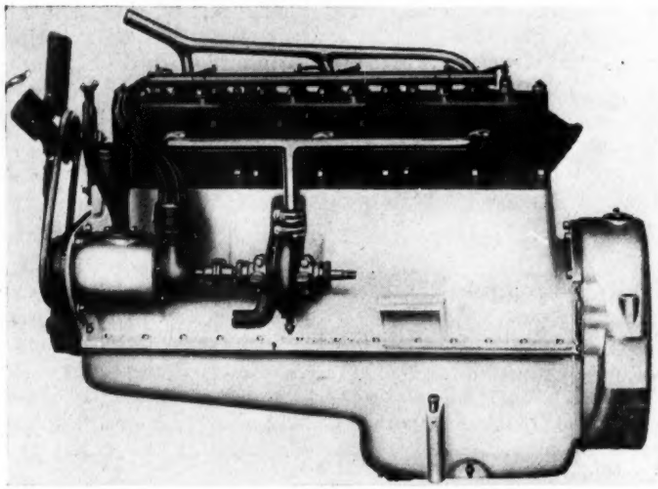
Rigid, Deep Section Aluminum Crankcase Is Feature of New Waukesha Bus Engine

Latest six, 4½x5¾, develops 103 b. hp. at 2000 r.p.m. Cylinders are cast in pairs and lower portion is oil cooled. Tappet carriers are mounted inside case.

By W. L. Carver

SEVERAL advanced features make the Waukesha model 6-A engine one of the most interesting developments in the field of six-cylinder bus engines. Liberal use and excellent distribution of aluminum alloy have produced a combination of relatively light weight and great rigidity. Although it has six cylinders of 4½-in. bore and a stroke of 5¾ in., this engine ready for delivery weighs only 1050 lb., which is low when it is considered that the engine is designed for the heavy duty involved in bus service.

Among the unusual features are the Ricardo head, the mounting of the tappet carriers in the aluminum crankcase which is unusually deep, and cylinders cast in pairs with comparatively short water jackets and long barrel extensions housed within the crankcase. The four-bearing crankshaft has unusually heavy sections throughout and is made of chrome nickel steel. Particular attention has been paid to the camshaft and its characteristics of rigidity as affecting silence.



Right side of new Waukesha six-cylinder bus engine. Note deep aluminum crankcase which encloses valve tappets

The curve of maximum power peaks at 103 hp., at approximately 2000 r.p.m., although the displacement of the engine is only 549 cu. in. A careful study of thermal conditions is responsible for this performance and for the fact that the curve of best economy goes as low as 0.56 lb. per b. hp. hr. The compression ratio is fairly high, but it is claimed that detonation is not experienced with ordinary fuels. Since low wall temperatures result in precipitation of moisture and deposition of unburned fuel in the crankcase, the water jackets are made fairly short and the lower ends of the cylinder barrels within the crankcase are oil-cooled, while the water inlet into each cylinder block is located just below the cylinder head joint. This type of construction is employed to maintain comparatively high temperature without danger of overheating and thus help to minimize wear and prolong engine life.

As viewed externally, this engine is exceptionally clean and symmetrical. Crankcase, oil pan and detachable bell housing are cast aluminum, while the timing gear cover, cylinder blocks and detachable heads are cast iron. The crankcase is exceptionally deep since it extends from the centerline of the main bearings upward to the ell formed by the water jacket around the ports in the cylinder blocks.

Lateral rigidity of the crankcase is assured by unusually heavy flanges both deep and wide, which are cored out for light weight and good metal distribution. The S. A. E. No. 2 bell housing bolts onto the rear end and provides two supporting arms, while the cast iron timing gear housing, which carries a barrel mounting concentric with the starting crankshaft, bolts to the front end.

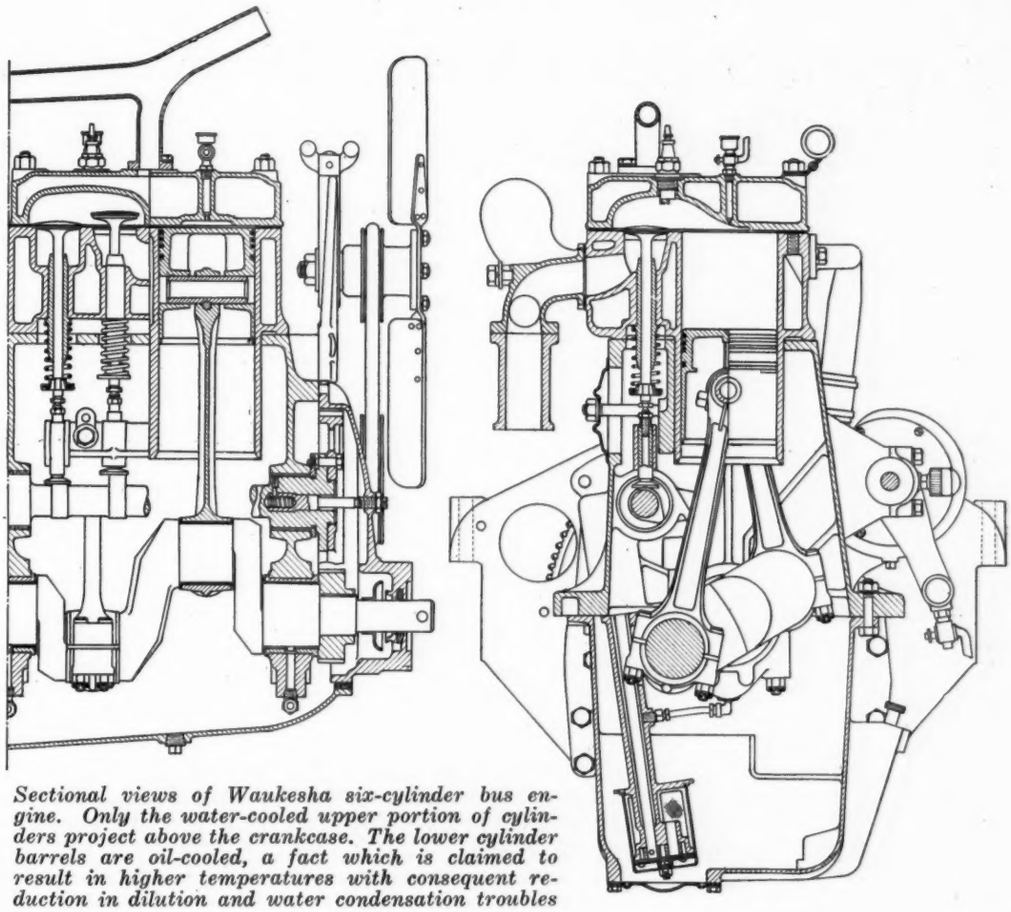
Four well ribbed bulkheads carry the main bearings, which are provided with deep section aluminum caps supported by four studs, which are not threaded into the aluminum, but are fitted with nuts at both ends. All main bearings are 3 in. in diameter and are mounted in bronze back bushings with Fahrig metal linings. The front and two intermediate bearings are 2⅝ in. long and the flywheel bearing is 3½ in. long. The crankshaft weighs almost 150 lb. in the rough and is heat treated to bring the elastic limit up to about 200,000 lb. per sq. in.

Connecting rods are 12¼ in. long between centers and the lower end has a four-bolt cap, the babbitt bearing being cast in. Crankpins are 2¾ in. in diameter by 2½ in. long. The rod is forged from 0.35 carbon steel and carries a bronze piston pin bearing of 1¼ in. diameter and 2¾ in. length. The pin is locked in a light alloy piston, which is equipped with four "Perfect Circle" rings, all located above the pin bearing.

As in other engines using the Ricardo head, the combustion space is nearly all in a dome over the valves on the right side of the engine. The uppermost point of the piston head travel is practically flush with the top of the cylinder block. The latter is most unusual, as the water jacket terminates just below the ports and the lower portions of the barrels extend into the crankcase for nearly 6 in. Water space is allowed all around the cylinder barrels and valve seats and, although the lower ends of the barrels are joined through a short distance to afford greater rigidity, an air gap separates them up to the joint with the outside of the water jacket.

With this arrangement about 5 in. of the length of the cylinder barrel is water cooled, while the balance, nearly 6 in., is oil cooled by the crankcase lubricant. Water enters the jackets at the centerline of each block of two cylinders and the outlet is placed near the top. Drain cocks are placed at the bottom of each water jacket. Standard straight thread spark plugs are located in the cylinder heads near the center of the combustion domes. Individual water outlets are connected to the radiator by a brass tube header.

Intake ports are siamesed in each block, while the exhaust ports are individual. Silchrome head valves of 2 in. clear diameter are guided in inserted cast iron bushings. The lower ends of the stems are case-hardened and the valve springs are secured by split washers and taper retainers. The intake and exhaust manifolds are located at the ports and held securely by clamps and studs. The clear diameter at the back end of the exhaust manifold is 3 in., while the intake manifold is designed to accommodate a standard 1½-in. vertical carbureter. No hot spot is provided and the intake manifold is the simple horizontal branch type.



Sectional views of Waukesha six-cylinder bus engine. Only the water-cooled upper portion of cylinders project above the crankcase. The lower cylinder barrels are oil-cooled, a fact which is claimed to result in higher temperatures with consequent reduction in dilution and water condensation troubles

Mushroom tappets are grouped in carriers for each pair of cylinders and the three carriers are bolted and doweled against finished bosses, which are in turn located on a wall which runs the full length of the crankcase interior. A detachable plate secured by one stud covers each tappet carrier and permits easy adjustment or removal of the entire carrier.

Like the crankshaft, the camshaft is mounted in four bearings, which are bronze bushings in this case. To guard against camshaft deflection, which is accountable for engine noises in many designs, the diameter of the shaft between the cams has been finished to 1 7/16 in. and the exhaust cams which are subjected to the heavier loads are located next to the bearings. Graduated barrel type bearings allow the removal of the shaft from the front end. The helical oil pump drive gear is cut in the middle of the third bearing from the front.

Helical metallic gears constitute the timing train at the front end. The crankshaft gear drives an idler, which in turn drives the accessory shaft at the left side of the engine and the camshaft gear on the opposite side. The camshaft gear drives the generator pinion.

The oil pump is located on the centerline of the third main and camshaft bearings, counting from the front, and is carried at the lower end of a tubular bracket which is inclined at a slight angle from the vertical. A cylindrical filter screen surrounds the lower portion of the bracket and the pump body. From the pump the oil is delivered through copper tubing to fittings on each of the bulkheads where these lines again are connected to the main and camshaft bearings.

This arrangement, in conjunction with a drilled crankshaft insures full pressure lubrication for all of the bearings. A drop pan and extension trough arrangement which forms part of the crankcase pan insures an adequate supply of oil on the most acute grades.

Large bronze bushings carry the accessory drive shaft in a barrel shaped projection at the left front of the engine. This projection is fitted with a breather and filler cap at the top and a bracket for an ignition head mounting at the rear. The drive shaft extends to the rear and is coupled to the shaft of a centrifugal pump which is carried in saddles machined in two projections from the crankcase wall. Two-bolt caps are located at each side of the pump and the packing gland adjusting nuts are outside of the caps and easily accessible. Another shelf to the rear of the pump accommodates the magneto and provisions are being made at this point for the installation of an air compressor for braking service.

On the opposite side of the engine the timing case extends to allow room for a generator of 7½ in. maximum diameter with a flange mounting. A starting motor of 5½ in. diameter can be placed on either side of the engine, since S. A. E. flange mountings are machined on both sides of the bell housing. An adjustable slide is attached to the front of the crankcase to accommodate a 20-in. diameter fan with a 1¾ in. range of adjustment, the fan drive being taken by Vee-type pulleys and cord belt from the front end of the accessory shaft.

A conical projection extending forward from the barrel mounting on the timing gear cover incloses the starting crankshaft.

Automotive Industries
November 13, 1924

French Tests Show Effect of Compression Variations on Engine Efficiency

Theoretical calculations checked up by practical experiments made with an eight-cylinder aircraft engine.

SOME experiments on the effect of variations in compression on the horse power and thermal efficiency of gasoline engines have been made in France and are dealt with in a communication to the Academy of Science by M. Paul Dumanois. The same author in a previous communication had shown that if anti-knocks should make the use of a compression ratio of 9 possible, instead of the present ratio of 5, common in aircraft engines, the explosion pressure would be increased in the ratio 1.9 and the thermal efficiency in the ratio 1.23, but that by reason of the higher specific pressures the mechanical efficiency would be reduced and that it would be wise not to count on a greater increase in the torque than 1.18 (instead of 1.23). These results were arrived at by purely theoretical considerations, and it was necessary to verify experimentally the order of magnitude of the gains which could be made.

To this end M. Dumanois operated an eight cylinder aircraft engine of 5.5 in. bore and 5.9 in. stroke successively with pistons giving compression ratios of 5.3 and 7. The engine was connected to a Froude water brake and in both cases the brake was so adjusted as to give the same engine speed, viz., 1830 r.p.m. Under these conditions, as nothing had been changed in the setting of the carbureter, the hourly fuel consumption was the same in both cases, so that the effect of a change in the compression ratio on the engine torque could be directly determined.

When passing from a compression ratio of 5.3 to 7 the theoretical thermal efficiency increases from 0.49 to 0.541, the ratio between the two efficiencies being 1.10. At the same speed of 1830 r.p.m. the powers obtained with the two compression ratios were 298 hp. with a 5.3 compression ratio and 330 with a 7 compression ratio. It will thus be seen that the increase in engine torque realized is equal to the theoretical increase in the thermal efficiency to within the limits of experimental error.

As regards the explosion pressures, theory indicates a ratio of 1.4, which was found to obtain in practice by the measurements made.

Measuring Explosion Pressure

Determination of the maximum explosion pressure was, moreover, a difficult problem, and the experimenter was led to make use of a different arrangement from that usually employed. From one of the spark plug holes communication was established through a very light valve to a pressure gage by means of a pipe coupling to which was branched a small bottle filled with carbonic acid gas at the pressure which was estimated to be that of explosion. During the operation of the engine a slight leakage was produced in the circuit. The hand of the pressure gage could then be seen to move downward very slowly and continuously, and when the pressure within the pipe coupling dropped to that of operation, there was immediately produced a regular wave which resulted in a very distinct vibration of the needle.

The results obtained in practice, as regards the increase in torque as well as in explosion pressure, with the compression ratio of 7 were substantially identical with those which had been calculated theoretically, and it would therefore seem that extrapolation for a compression ratio of 9 is perfectly legitimate.

One is particularly justified in assuming that the increase in the engine torque approaches more closely to the ratio of thermal efficiencies than had been foreseen.

Maximum Temperature Higher, Mean Lower

There was one other point which it was interesting to verify. When the compression increases the thermal efficiency increases as well, and, in consequence, more calories are transformed into mechanical work. The mean theoretical temperature of the cycle therefore diminishes, notwithstanding the fact that the explosion temperature is higher. It is therefore important to determine if, from the point of view of the different parts subjected to the combustion temperature, the instantaneous increase of the explosion temperature has a greater influence than the reduction in the mean temperature of the cycle. This question is particularly important for the head of pistons made of an alloy which fuses at about 1100 deg. Fahr.

In order to measure the temperature of the piston heads there were cut on the latter radial grooves into which were poured alloys with melting points ranging between 392 and 675 deg. Fahr., the latter being the melting point of metallic lead. The mean of a score of measurements made with the engine having a compression ratio of 5.3 gave results that were absolutely consistent, which showed particularly that the temperature at the center of the piston head was in the neighborhood of the melting point of lead (675 deg. Fahr.), while at the edge of the head the temperature was only from 27 to 36 deg. lower. With a compression ratio of 7 the temperatures found were substantially the same.

The same observation was made as regards the mean temperature of the exhaust valves in the two cases, there being even a slight tendency toward lower temperature with the higher compression ratio.

Finally, as regards the number of calories carried away by the cooling water, there was slight diminution with the compression ratio of 7.

It may thus be said that increase in the compression ratio does not result in any increase in the temperature of the parts, so there is no increase in thermal fatigue.

The fuel used in these tests was benzol, which, contrary to gasoline, does not give rise to the phenomena of detonation. The compression ratio of 7 was not exceeded for the reason that this is the maximum which the parts of the aircraft engine tested would withstand with safety.

The results obtained as recapitulated above completely confirm the identical theoretical results as regards the interest of a high compression ratio in aircraft engines with the use of non-detonating fuels. The increase in the horse power obtained per unit of piston displacement and the reduction in the specific fuel consumption also make the use of high compression engines with non-detonating fuels interesting from the automobile point of view.

Books for the Business Bookshelf

TRAINING automotive mechanics, developments in use of aluminum, French fuel researches, a new edition of R. W. A. Brewer's book on carburetion, and a report of an investigation of marketing costs in the accessory field, are subjects of recent books of special interest to the automotive executive.

A NEW work of an elementary character which has been brought out by John Wiley & Sons, Inc., New York (Automotive Construction and Operation, by J. C. Wright and Fred C. Smith, price $3) is addressed to four classes of readers, viz., the student just entering the automotive field, the employed mechanic, the owner and the salesman. While the bulk of the work is devoted to the gasoline automobile and its components, some attention is also given to steam and electric cars. The subject matter is divided into numerous chapters and the general arrangement is quite systematic. The book is printed in large, clear type and is well illustrated.

On the whole, the degree of technical accuracy is fair, though misstatements occur here and there. Thus, for instance, on page 83 the statement is made that "under ordinary conditions the ratio between gasoline vapor and air remains constant at all speeds." The fact is that this ratio varies with the speed to such a degree that the simple carbureter is useless for any but a constant speed engine. A few other inaccuracies appear in the book, but they are not of sufficient number or importance to detract materially from the value of the work.

AN interesting review of developments in the aluminum and bauxite industries, written by Robert J. Anderson, appears in The Mineral Industry During 1923, which has just been published by the McGraw-Hill Co. of New York.

The article deals with the fluctuations in the demand for and the price of aluminum in recent years and discusses the various outlets for the metal. During the year 1923 practically every branch of the industry reached a new high level, and the chief factor in the revival from the slump of 1921 was the automobile industry. Considerable aluminum sheet and molding is used in closed car body manufacture, and while the new fabric body is expected to make considerable inroads in the use of aluminum for bodies, this had not yet been felt at the time the material for this article was compiled. During the year under review the demand for aluminum pig by the casting trade was exceptionally strong, as was the demand for aluminum sheet by automobile and utensil makers.

WHILE the efforts made in France to find a motor fuel of domestic origin have received the greatest amount of publicity, similar movements were started in several other countries during or shortly after the conclusion of the war. In England this movement is being conducted by the Empire Motor Fuels Committee, which has just issued a report, incorporated together with reports of allied researches in Vol. XVIII, Part I, of the Transactions of the Institution of Automobile Engineers. The General Committee has three working subcommittees, each of which deals with a certain phase of the work in hand. These are the Engineering Sub-Committee, the Denaturation Sub-Committee and the Alcohol Excise Sub-Committee.

From the organization of the Committee it may be inferred that a great deal of the work done by it relates to the utilization of alcohol in internal combustion engines. This inference is evidently correct, for the section of the book which properly forms the report of the Committee, and which constitutes about one-quarter of the whole work, is devoted to reports on tests made with 95 per cent alcohol, 90 per cent alcohol and alcohol-ether mixtures.

About the same amount of space is given to a report of the experimental work done by Harry Ricardo for the Asiatic Petroleum Co., and which is familiar to our readers from its publication in these pages. The introductory chapter is devoted to a discussion of "The Character of Various Fuels for Internal Combustion Engines," by H. T. Tizard and D. R. Pye, a theoretical work of high order.

Other contributions to the volume are as follows: The Work of Midgley and Boyd on Detonation, by Dr. A. E. Dunstan; Solubility Relations and other Properties of Mixed Fuels, by Dr. W. R. Ormandy and E. C. Craven, and Further Notes on Fuel Research, by H. R. Ricardo.

The work contains a wealth of data on both petroleum and alcohol fuels and should interest all those having to deal with problems arising in the use of these fuels.

While the volume forms part of the Transactions of The Institution of Automobile Engineers, we take it that copies can be purchased by non-members.

A NEW edition of Carburetion by R. W. A. Brewer, published by Crosby, Lockwood & Son of London, has been issued. This is the third edition of the work and it does not differ materially from the second edition, except that a certain amount of material descriptive of new designs of carbureters and also some notes on papers presented before technical associations in recent years and chiefly dealing with fuels, have been added. A key to the character of the work is given by the introductory sentence of Chapter I in which the title of the book is defined: "By the use of the word 'carburation' it must be understood that this word will designate the art of mechanically mixing or blending a liquid fuel with a certain amount of air, and that whether this art is carried out to the limits of perfection or not, is an indication of whether the carburation is good or bad."

OPERATING expenses in the Retail Automobile Tire and Accessory Business in 1923 is the title of a bulletin recently issued by the Bureau of Business Research, School of Business Administration, Harvard University.

The outstanding conclusion reached is that tire merchants, because of inadequate records, have not known the true cost of doing business, with the result that few concerns in this line are in a strong financial condition and too few operate at a profit.

A COPY of a pamphlet descriptive of the Fahy Simplex permeameter has been received from Frank P. Fahy, 50 Church Street, New York. The pamphlet also deals with the subject of magnetic testing in general.

Five Machines Devised to Meet Various Needs of Car and Parts Manufacturers

Three new electric welders designed especially for production work, a new self-oiling, ball-bearing, heavy duty drill press and a belt surfacing machine developed.

A NEW automatic rim welder manufactured by the Thomson Electric Welding Co. of Lynn, Mass., which has been supplied to a number of automobile rim plants in the West, has a comparatively large transformer (150 Kva.) and may be furnished for use on any ordinary a.c. commercial current line. This machine is illustrated in Fig. 1.

The cycle of operation of this machine is as follows: The operator places the rim into the clamp, presses on a pedal, which opens an air valve, closing both sides of the clamp, and at the same time starts the operation of welding. The welder flashes off a predetermined amount, cuts off the current, makes the final pushup and stops. The operator pushes the pedal again, and the clamps open, releasing the rim, and the platen returns to the starting position.

This welder lends itself to considerable modification as to the manner of welding. For instance, two pedals can be used, one for closing each side of the clamp, and in addition a lever which has a range of motion of only about an inch, for actually starting the operation of welding. When the welder is set up to operate in this manner, it not only allows the operator to inspect the clamping of each end of the rim while in progress or after being coupled, but also gives him time to move away from the direct line of flash before he starts the welder in operation. In this case, as in the first, the clamps are released and the platen is returned to its starting position by another stroke of the pedal.

This machine can be used on flat, round and irregularly shaped stock. The design has been worked out so that particles thrown off from the work cannot get into the moving parts. The welder and oil gear are mounted on a base which provides a very rigid connection between the two. With the ordinary rim the time of current flow is two seconds and an operator will normally turn out 600 ordinary sized rims per hour.

Fig. 2 shows the No. 25 automatic butt welder is operating on steel parts having a cross section of .15 sq. in. The machine has an electrical capacity of 60 Kva., with 83 power factor, and can be furnished to operate on a.c. lines of different voltages and frequencies. It will weld iron or steel parts having a cross section from 0.1 to 0.5 sq. in. The machine illustrated, operating on stock of .15 sq. in. cross section, is claimed to weld as fast as the operator can feed the parts into the air clamps, up to 1800 pieces per hr. The parts are brought together entirely by mechanical means, through cams.

The operating cycle is as follows: Operator places work in the clamps, steps once on a pedal, which closes the clamps. As soon as they have accurately gripped the work, the machine automatically turns on the current, starts "flashing" and completes the weld, then continues to open the clamps and return to the starting position. This entire cycle is completed by a single movement of the pedal in two seconds of time.

Model 15 automatic butt welder is illustrated in Fig. 3, equipped for welding pressed steel pedestals, the column being welded to the base. This machine is equipped with a 62 Kva. transformer suitable for operating on any commercial alternating current lines. It can be readily equipped to handle stock of any ordinary shape of cross section, of a sectional area between 0.1 and 0.5 sq. in.

With this type of welder the cycle of operation is as

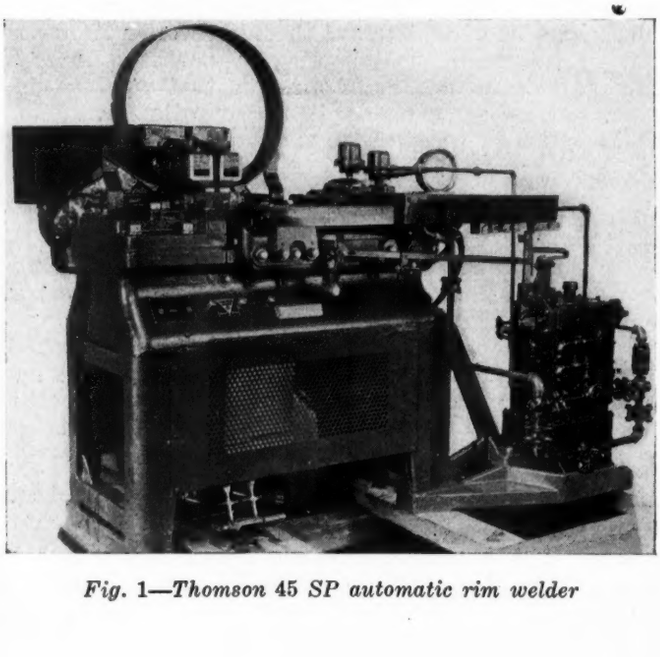


Fig. 1—Thomson 45 SP automatic rim welder

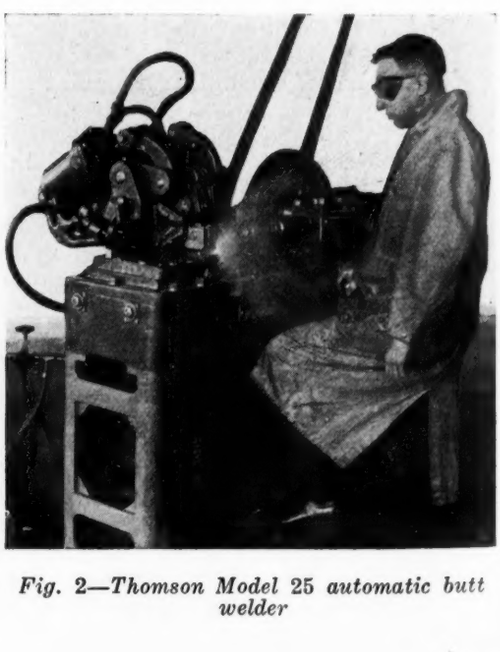


Fig. 2—Thomson Model 25 automatic butt welder

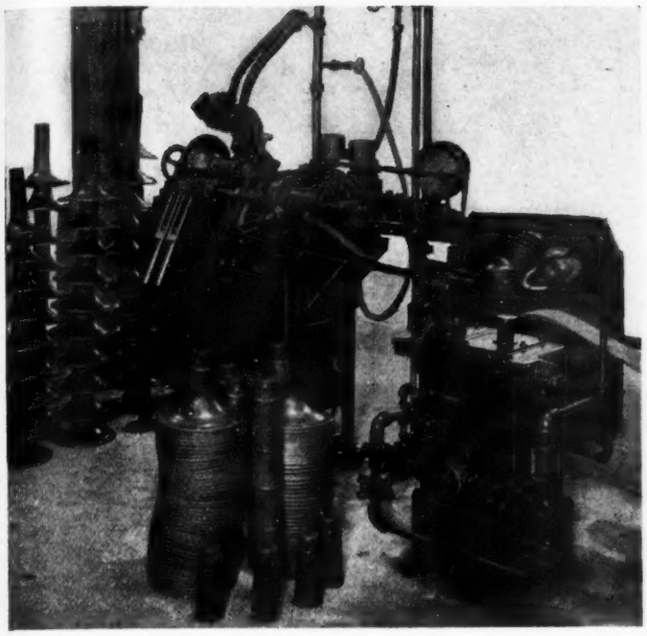


Fig. 3—Thomson Model 15 automatic butt welder

follows: Parts are inserted in the welder and clamped by hand. The operator then trips a conveniently located, short hand lever, and this automatically turns on the current, starts the movement of the platen, which "flashes" the work until the required heat is obtained, then delivers a final welding pressure and cuts off the current. In this case the pressure is generated through an oil gear pressure pump driven either from a line shaft or a motor. As soon as the clamps are open, the platen travels back to its starting position and is ready for the next welding cycle. The speed of this machine is more or less limited by the loading operation. The actual time of current flow on the job in question is said to be approximately two seconds.

Heavy Duty Drill Press Suited to Variety of Work

A NEW heavy duty drill press fitted with ball bearings throughout, self-oiling and having all its gears made of steel, has been put out by the Barnes Drill Co. of Rockford, Ill. It is known as the No. 210 and has been designed to meet the requirements of manufacturing plants having large quantity production.

This is a multi-purpose machine with speed and feed set-ups for any particular job. Take-off crown gears provide for any single speed from 100 to 2000 r.p.m., thus handling all high speed twist drills from ⅜ in. to 1½ in. to their maximum working speed in any material. Slip gears make possible a wide range of feeds. Geared threads leading feeds to pitch of tap may be provided for all tapping work.

The crown gears may be quickly exchanged for faster or slower speeds. The feed slip gears are conveniently located on the right-hand side of the machine for quick exchange when changing jobs. All gears are made of chrome nickel steel and the more important ones are heat-treated. The gearshafts and crown gears are mounted on ball bearings, and the whole machine is automatically lubricated.

The spindle is provided with six splines, which is said to be an innovation in drilling machine spindle design. A roller thrust bearing with a double row of staggered long and short rollers takes the thrust on the spindle.

Provision is made for motor drive, the motor being directly connected to the drive shaft by means of a flexible coupling. A 5-hp. motor with a speed of 1200 r.p.m. is recommended. Instead of the motor drive, a belt drive may be used, in which case a clutch pulley or tight and loose pulleys are mounted in the same location.

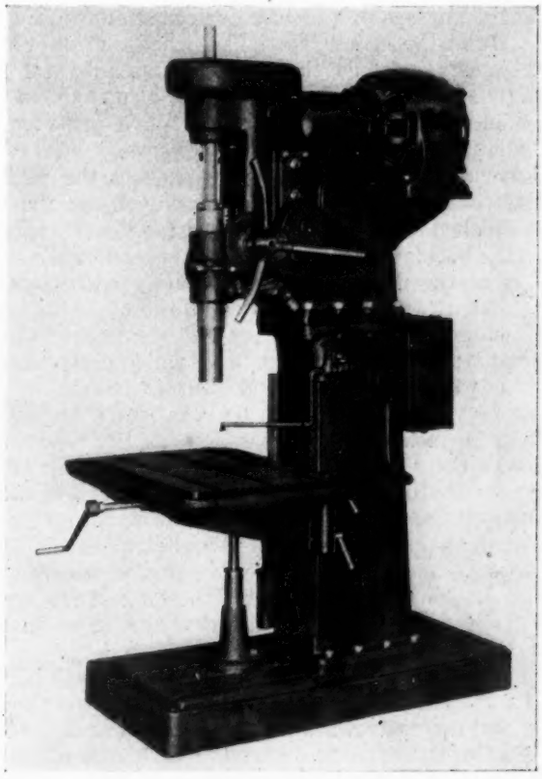
The counterbalance chain winds around the internal gear pinion shaft, facilitating the quick return of the spindle. A safety device is provided to prevent overloading and minimize breakage of twist drills. Feed is by spur gears instead of the usual worm and worm gear, the design of spur gear feed being the subject of a patent application.

Power feed may be engaged or disengaged when the spindle is running. Without motor and starter the drill weighs 1700 lb.

Belt Grinding Machine Can Be Used on Wood, Metal and Bone

THE Porter-Cable Machine Co. of Syracuse, N. Y., which has been manufacturing a belt-surfacing machine for about two years, has come out with a smaller sander and grinder with a grinding bed of 6 by 18 in. The grinding bed can be used in both the horizontal and vertical positions. A ½-hp. motor is provided, which is said to have ample power for all work within the capacity of the bed.

Many different kinds of belt can be used, which permits a wide range of operations on wood, metal, horn, bone and composite material. For work requiring a curved surface the upper pulley may be used as a semicircular spindle. The table, which is equipped with an angle gage, is removable for work requiring the full use of the grinding bed or it may be used as a stop when in the horizontal position.



Barnes Drill Co.'s No. 210 drill

Double-Action Press Proves Economical in Production of Cowls

Has toggle operated pressure plate and special pneumatic ram in base. Control is such as to permit of continuous run or stopping at given point in stroke.

A DOUBLE-ACTION press, equipped with special dies, has shown a considerable economy in the forming of cowls for both open and closed bodies at the body plant of the Packard Motor Car Co. The production rate has been increased materially and the same press is utilized for operations on closed-body doors in the intervals between runs of cowls.

This press, which is a Toledo No. 796-D, is equipped with the usual ram actuated by two connecting rods, a toggle operated pressure plate and a special pneumatic cylinder and ram in the base. The control is arranged so that the press can be operated continuously or stopped at a given point in the stroke. The latter feature is important, as it allows the substitution of the mechanical for the hydraulic press which ordinarily is assigned to work of this nature.

Ram Carries Three Part Punch

As shown in the illustration, the ram of the press carries a three-part assembled punch, the center member of which is attached to the ram, is wedge shaped and provided with ways carrying the two outer members. Being wedge shaped, this center portion acts as an expander as the ram descends and forces the two outer sliding members outward toward the side faces of the die.

As this action takes place only when the two outer members contact with the sheet metal in the bottom of the die, the top surface of the cowl is ironed out to a smooth finish. When the center portion reaches the lowest point of its travel, it forms the middle section of the bead, which is visible just back of the hood, also the depression for the accommodation of the hood hinge and completes the surfacing of the top of the entire cowl.

In order to clear the finished cowl from the dies it is essential that the lower die assembly open, as the width of the finished cowl is somewhat greater across its top than at the bottom. To accomplish this result the two side members of the die are made separately and secured by heavy coil springs to angle plates at the opposite ends of a special base block. The halves of the die are closed by slides mounted on the pressure plate which descends somewhat in advance of the ram and built-up punch.

These four slides which can be seen in the cut are machined to tapered or wedge surfaces at their points and again near their bases. The points contact with bearing blocks near the bottoms of the two halves of the die and the tapers at the bases contact with the upper portions of the die halves. In this way the two halves of the die are brought together or clamped without the possibility of cocking or tilting. The points of the long slides are supported as they engage with the dies by the angle plates on the special base block.

In operation, a sheet of metal is buckled sufficiently to allow its introduction into the dies as they are shown in the cut, and the control is shifted to put the press in operation. The pressure plate descends in advance of the ram and closes the die by the time the two outer halves of the punch reach the bottom.

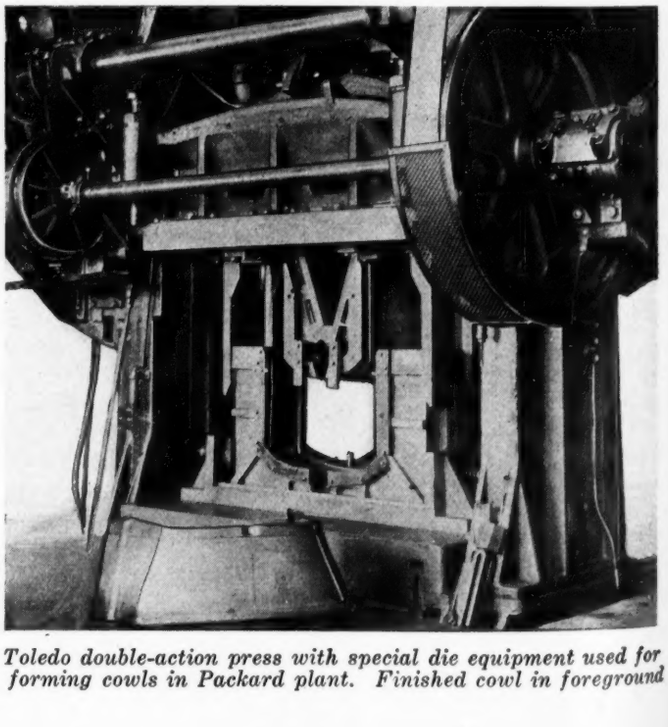
With the two halves of the die in position, the punch expands, ironing out the metal over the top of the cowl and forming the sides. The bead back of the hood and the hinge depression are formed, as already described. Also, the metal at the back of the cowl is formed for the door joints and the supports for the windshield support as well as the contour of the windshield opening.

On the up stroke of the press the punch contracts first and clears the formed metal. Then the die opens to permit removal of the cowl from the open ends.

As an excess of metal is allowed all around the cowl, this part is trimmed to size in a subsequent roller shearing operation. The cowl ventilator and windshield bracket openings are punched out in smaller press operations.

Practice at the press is varied somewhat, and some changes are made in the die equipment for forming the cowls of open models as these parts are designed with beads which extend longitudinally just below the upper corners. In this case the press is put into operation in the same manner as for the closed-body cowls. However, the press is stopped at bottom dead center while the metal is clamped completely. Then the air cylinder in the base of the press is thrown into operation to release wedge slides which form the beads by means of spring actuated secondary dies. After the beads are formed, the ram and pressure plate are returned again to the top center position.

This press is utilized also for re-forming closed-body doors. In this operation the air cylinder in the base also plays an important part.



Toledo double-action press with special die equipment used for forming cowls in Packard plant. Finished cowl in foreground

EDITORIAL

Attractive Body Designs

IT does not seem to be sufficiently recognized in the industry that a high degree of aesthetic perfection of the outside form is one of the more important features which make a car desirable to the prospective owner. Every prospect, of course, wants the maximum of comfort, reliability and durability that can be bought for the price which he has set as his limit. It appears, however, that with respect to these features we are approaching close to a common level, as those firms which for one reason or another are unable to offer the value represented by the average car are gradually being eliminated. The purchaser naturally feels that within the narrow price range generally considered there is very little difference in the values offered for the money, and that whatever slight differences there may be are very hard for him to gage, except possibly by the experiences of friends who may own cars of the different makes considered.

On the other hand, every purchaser considers himself a competent judge of appearance. There is no standard of measure for attractiveness, and if any group of individuals were asked to choose between two or more average cars on the basis of appearance alone there probably would be much difference of opinion. Still, it is true that certain designs appeal much more strongly to the taste of the general public than others, and body designers, certainly, should make a profound study of the forms and lines that attract the public's fancy. The successful body designer evidently must be a talented artist.

German Trusts and Taxes

AN illustration of how the industrial structure of a country may be affected by legislation is furnished by conditions brought about in Germany by the sales tax. This tax has an important influence on the cost of production of articles that pass through several intermediary stages of manufacture and therefore change hands a number of times.

For instance, a car manufacturer ordinarily does not make the carbureter himself, but buys it from a specialist. This latter may buy the sheet metal pressings for the floats from a manufacturer of pressings or deep drawings, who, in turn, buys his sheet brass, and so on. Thus, before this particular piece appears in the completed car it has changed hands quite a number of times, and a sales tax has been paid on it every time. Then, when the completed car is sold to the private owner there is another tax to be paid, and although the tax on each transaction may be only a few per cent of the total amount paid for the car by the ultimate consumer, quite a considerable proportion goes to the Government.

Probably every new tax induces efforts to evade its payment, and this sales tax is no exception. This is borne out by the fact that in Germany recently a number of automobile manufacturing establishments have been bought up by the Stinnes and other groups of coal and iron industrialists which control the raw materials of the engineering industries. These groups are now building up so-called vertical trusts in order to avoid the payment of a sales tax at numerous stages in the fabrication of metal products.

Fuel Today and Tomorrow

CHEAP gasoline is available today largely because of over production of crude which resulted in part from the rapid development of new fields with phenomenal and quite unexpected output. Partly because of these fields, partly because of a higher recovery of gasoline from crude and partly because of improved technique in geological, production and refining ends of the business, the oil industry has been able to keep a few steps ahead of the demand which also has grown by leaps and bounds.

All these appear to be fortuitous circumstances so far as the automotive industry is concerned, but there are elements of danger in them which should not be overlooked. Recent investigations indicate that there is small prospect of a feul stringency, let alone a fuel shortage, for many years to come, but this is no reason for assuming that our supply will remain always as favorable as it is today. Nor is it any reason for wasting such a valuable resource as our oil deposits constitute.

There appears to be ahead a phenomenal development in bus and truck transportation, not to mention the normal increase in the number of private passenger cars which the industry counts upon selling. Consequently our demands for fuel are bound to grow rapidly.

Furthermore, great automotive expansion in other parts of the world is more than likely. If it comes to pass it is expected to involve greater gasoline exports. In fact, such exports have increased some 40 per cent this year. The automotive industry is interested vitally in increased foreign sales which will be impossible unless comparatively cheap fuel is available for foreign purchasers.

These are some of the things which make reasonable conservation desirable. It is not enough to conclude that American car users are not interested in having cars which travel further per gallon of fuel consumed. Even if this be true, and we greatly doubt if it is, it is worth while saving fuel for a possible rainy day ahead. It is just a good form of insurance, a kind of insurance which every automotive vehicle manufacturer should acquire through efforts to make his product more economical in fuel consumption.

Our Industry Today—

Optimism Prevails for Remainder of Year, With Farmers Inclined to Increase Their Closed Car Purchases

NEW YORK, Nov. 10—Reports from automotive dealers throughout the country on prospects for the remaining months of the year reflect a wholesome optimism, particularly in those sections where business has been hampered for one reason or another. No area, however, expects any strong movement forward in sales that would carry the total volume beyond present conservative estimates. Farmers are buying more new cars than heretofore and may be disposed to increase their purchases of used cars, of which there appears to be a surplus with many dealers.

The last quarter of the year as a usual thing is slow, buyers marking time and producers, unless planning to increase output to prepare for spring demand, keeping to a like pace. One large automobile producing plant will close for a few days this month to take inventory but the majority will continue operating without interruption, although not maintaining high schedules, until the latter part of December, when there will be a more or less cessation or interruption of operations to place plants in readiness for 1925 demand. In the last two months a year ago, output of cars and trucks totaled 616,197.

Little comparison, however, can be made between this year's and last year's activities, due to the great difference in conditions. Output in 1923 took care of buyers who had not been in the market for several years and operations were kept at a high point almost continuously throughout the year to meet this demand.

Reserve Stocks Small

While the output of the greater part of last year was readily absorbed and a shortage of cars was reported during some of the period, much of it toward the end of the twelve months went into storage either in dealers' sales rooms or in the manufacturers' warehouses to forestall the possibility of a shortage in the following spring.

Production this year was maintained at a high figure the first five months, a decline setting in when it became apparent that the stemmed demand of the year before had been well taken care of and the anticipated spring rush was not forthcoming at the time expected. The industry for the last five months has followed a conservative gait, manufacturers watching closely the trend in the sales field before augmenting their programs. Notwithstanding changed conditions in the two years, output for the ten months of this year has fallen only 286,422 below the total reported for the corresponding period a year ago and practically all this output has been absorbed. There are comparatively no reserve stocks in the hands of either dealer or maker.

General Price Cut Is Not Expected

Reductions Made Only in Several Fields—Better Business in View for 1925

DETROIT, Nov. 12—Analysis of the several price cuts announced recently by manufacturers in a number of price fields fails to indicate anything that might be interpreted as a general swing to lower prices. There is nothing in the price cuts which would interfere especially with the general merchandising of cars, and manufacturers as a group are occupying a price position which can be changed only as demand becomes considerably increased.

Several reasons may be ascribed for the decreases announced in the last few weeks. In one case the manufacturer is seeking to increase a demand for a particular body type in which it is already practically specializing. The fact that its production is heavily of this particular model makes it possible to bring prices on it low. In another case the intent is evidently to concentrate production to a large extent on low priced inclosed model, and, in the third, a general sales stimulus is sought.

The industry as a whole is enjoying a nice volume of business at prices which make the somewhat low production profitable. The movement to higher prices was carefully planned and made effective without any material slowing of buying and the general scale of prices is certain to remain as it is until demand again reaches or approximates factory capacities. In the opinion of the industry generally this will not be before the spring months arrive. So far as the general public is informed, automobile prices are today as low as they ever were.

Election results from the industry's viewpoint are favorable for a general stimulation of business. Factory officials report an already perceptible improvement in practically all parts of the country, but they do not look for this to be evidenced in heavy production until at least the early part of next year. Demand has been good in most parts of the country and will be better during the balance of the year. However, the real effects of the election on business are not expected to become manifest until 1925 gets under way.

Several of the industrial sections of the east which suffered the most during the pre-election months are expected to show an immediate turn for the better. Reduction of sales in these districts have been mainly responsible for reduced operations generally. As these districts resume buying the trade of the whole country will improve.

The farm markets have been much better in the latter part of this year than for several years past, regardless of the fact that a national election was approaching. This market is expected to show continued buying in good volume with probable increases in view of the confidence in the administration reflected in the farm vote.

As a whole the industry is pleased with the prospects of improved business under the Coolidge regime, but it is not indulging in any plans for expansion at this time. The retail situation has been greatly improved by cautious manufacturing during the last six months. It is believed this work might be undone by attempts to quicken the market too soon.

Optimism Follows Election

CLEVELAND, Nov. 13—Automobile manufacturers in this city report that the result of the elections has brought a more optimistic feeling about the future among wholesalers and retailers throughout the country. The majority of the reports coming into the offices of manufacturers, however, do not show there has been specific improvement in sales since the election. Producers do not look for a great improvement in sales until the shows.

Stromberg Carburetor Acquires a Subsidiary

NEW YORK, Nov. 13—Stromberg Corburetor Co. has acquired and will operate as a subsidiary the Stromberg Research Co., manufacturer of an automatic windshield wiper. The company is paying for its acquisition with 5000 shares of its capital stock which are being issued out of the 75,000 shares of new stock authorized by stockholders at the beginning of last year.

With the issuance of this 5000 additional shares, there will be outstanding 80,000 shares of capital stock and there will remain unissued 70,000 shares of the authorized capitalization of 150,000 shares.

Dort Offers Service Business For Sale

Bids Sought in Continuance of Liquidation of Assets of Company

DETROIT, Nov. 8—Proceeding with the liquidation of Dort Motor Car Co., announcements have been sent out this week to leading parts supply companies inviting bids on the general service business of the company. The liquidation of the assets of the Dort company, in process for several months, has never been formally announced to this time, owing to the possibility of reorganization of the company as a car manufacturing entity.

The sale of the service business of the company will follow a consideration of bids from the parts companies, required to be in by Nov. 10. If the bids do not reach the proportions which the Dort company considers equitable, a company will be organized among officers of the former company to continue the parts business. This will be entirely separate from the general liquidation proceedings.

Over 85,000 Cars in Service

According to J. Dallas Dort, president, who is directing the liquidation personally, there are from 85,000 to 100,000 Dort cars in service, the parts business on which ran to $2,000,000 in 1923. This business will continue for at least several years, said Mr. Dort, and the handling of it constitutes a nice little business in itself, which he will take over with some of his associates, if the bid from outside companies is low.

Although the liquidation has been going on for some time, Mr. Dort says there is still some hundreds of thousands of dollars' worth of factory equipment independent of the factory buildings and other properties. These will continue to be sold as satisfactory opportunities present themselves, but the liquidation may continue for several months or longer. The conditions of the liquidation are such that good market opportunities may be awaited on all the assets and holdings.

Dort Not Manufacturing

The Dort company, however, is now definitely out of the car manufacturing field, although up to the very recent past there was possibility of a reorganization with some well-known figures in the industry participating. It is understood that if these plans had matured Mr. Dort would have turned over a large part of his holdings in the former company for stock in the new one. The time in which action on the new company was to take place expired last Saturday, and the liquidation is now formally declared to be under way.

There are no cars of any kind in the company's hands nor any material for the manufacture of cars. All material has been worked off, and all cars sold. A considerable part of the material was made into parts and sold to many former Dort dealers, who stocked to take care of the requirements of their former Dort customers. The general service business will take care of replacements.

The company has several groups of manufacturing buildings, one group in the center of Flint, a part of which has been taken over for warehouse purposes by other business of the city. The remaining buildings of this group are offered for warehouse or wholesale business sites. The new factory property is on the outskirts of the city, a modern plant erected several years ago, but occupied only in part for car building purposes. The former body plant of the company at Kalamazoo was sold several years ago.

Mr. Dort declares that the liquidation of the property will require his continued personal attention for at least several months, after which he will consider, probably, some further activity in the industry. He has many personal interests, he said, to any of which he may confine his attention. "I'm only a kid yet," he declared, "and I'm liable to do any of a number of things, except retire from active business."

MUCH U. S. CAPITAL INVESTED IN CANADA

WASHINGTON, Nov. 12—American capital invested in the automobile industry of Canada represents 69.2 per cent of the total investment which is $24,498,000, figures sent to the United States Government showing the ownership of industrial capital invested in Canada in 1920 show.

The figures show that but 30.7 per cent of the automobile industry in that country is owned by Canadians, while 0.1 per cent is held by stockholders in England. In but one other industry—the artificial abrasive manufacturers — is the percentage of American owned stockholders higher than that of the automobile trade.

In the abrasive trades 98.7 per cent of the stock is owned by Americans. From a standpoint of value, the automobile industry, in that year, ranked twentieth on the list of major industries in the country.

PARTS COMPANY INCORPORATES

ST. CLOUD, MINN., Nov. 13—The Diamond Motor Parts Co. has been incorporated at $1,000,000 and will replace the Mutual Motor Co. as owner of the plant and equipment of the former Pan Motor Co. It will manufacture automobile parts. G. B. Bouthinon of Minneapolis is president.

Stewart-Warner Gets Bassick-Alemite Corp.

Seven Shares of Former to Be Exchanged for Each Ten of Latter

CHICAGO, Nov. 12—Control of the Bassick-Alemite Corp. has been acquired by the Stewart-Warner Speedometer Corp., according to an announcement by the latter organization. Negotiations to this end have been in progress for some time, with the result that the majority of stockholders of the Bassick-Alemite Corp. have agreed to the sale on an exchange of stock basis of seven shares of Stewart-Warner for ten shares of Bassick-Alemite. An announcement offering the same basis of exchange to Bassick-Alemite minority stockholders is to be made soon.

The merger will combine the interests of two of the country's large and important automotive establishments, forming a corporation with assets of about $37,000,000. Total assets of Stewart-Warner, according to the latest available balance sheet, are $27,006,165, while the most recent report puts Bassick-Alemite assets at $9,924,223.

Factor in Lubrication Field

The Bassick-Alemite Corp. owns all outstanding common stock of the Bassick Co., which has plants at Bridgeport and Meriden, Conn., and Newark, N. J., and 5000 shares in the Bassick Manufacturing Co. with a plant in Chicago, the remainder of the stock being owned by the Bassick company.

Last spring the Bassick-Alemite Corp. acquired the Allyn-Zerk Co. of Cleveland, manufacturer of lubricating devices, while last winter it bought control of the E. S. Evans Co., manufacturer of blocks, cratings and boxes used in the shipment of automobiles. With the consolidation, these various interests pass over to Stewart-Warner's control, giving it a much widened and profitable scope of activity.

Numerous Economies Effected

Bassick-Alemite's net earnings in 1923 amounted to $1,422,583, equivalent after amortization of patents and preferred dividends to $6.18 a share earned on the common stock.

While no statement relative to detailed plans of operation under the merger is available, it is understood that intentions are to continue the operation of the Bassick-Alemite plants. Numerous economies, however, may be effected through a consolidation of merchandising forces.

N. A. C. C. DINNER JAN. 6

NEW YORK, Nov. 12—The annual dinner of the National Automobile Chamber of Commerce will be held Jan. 6, during show week, at the Hotel Commodore.

Hupp to Use $1,250,000 Equipping Factory

New Eight-in-Line Car to Be Made in Plant Heretofore Unoccupied

DETROIT, Nov. 12—The only expenditure Hupp Motor Car Corp. will make in bringing out its new eight-in-line car will be for the equipping of a factory building, of which it has been the owner for a number of years, but which it has never previously occupied. According to C. D. Hastings, the equipment for this building, which will house the engine plant and the assembly line, will approximate $1,250,000.

The building to be occupied lies at the east end of the main Hupp plant in this city. It was leased for a number of years to a car heater manufacturer and to the Detroit Electric Car Co. Here the engine work and all assembly work will be done on the eight, other manufacturing units of the corporation supplying other parts. Manufacture of the four and eight will be kept entirely apart. Schedules on the two vehicles are understood to call for three fours to two eights, approximately 50,000 of the two vehicles to be built yearly.

Preparations for manufacture are now going forward. The car will be exhibited at the national shows in January, at which time formal announcement of its general features and price will be made.

Mercedes-Benz Merger Officially Confirmed

NEW YORK, Nov. 13—Confirming a report made some time ago, announcement is now made by American representatives of the merging of the Mercedes Automobile Co. and the Benz Motor Works of Germany.

The announcement, issued by the American Mercedes Co., states that the combination will have a marked effect upon the American automobile industry and that it means the beginning of standardization of the automobile in Europe. As a result of the merger the purchasing power of the two companies combined will be greatly increased, it is said.

The announcement says:

With the amalgamation of the Mercedes Automobile Co. and the Benz Motor Works, there comes a new condition in the manufacturing and financial situation in Germany. This is considered either a true sign of prosperity or an interesting phase in the recent adjustment of affairs in Europe.

Involving as it does such large and old companies as the Mercedes and the Benz, the importance of the merger is bound to be felt in this country. In the first place it means the beginning of a standardization of the automobile in Europe; in the second place it means a firmer financial condition in Germany, and both are very important to America.

Officials of the Mercedes Automobile Co. have recently been in this country with a view to making purchases of required raw material.

CITROEN SPECIALIZES ON ALL STEEL BODIES

LONDON, Nov. 3 (*by mail*)—Andre Citroen, at a luncheon given to British agents, stated that the Paris factory is concentrating on the production of all steel bodies. Citroen will be the first European firm to take this line. The factory is to be trebled in size, and production is to reach 500 cars daily.

The trans-Sahara motor route from Colomb Bechar to Timbuctu is to be opened in two or three days' time. Hotels are to be erected at six points in the desert, and travelers will enjoy all the amenities of civilization in the midst of the Sahara. It is the ambition of the company to extend these motor lines to Dakar, Khartoum and the Belgian Congo.

Defiance Truck Plant to Be Used for Bodies

DEFIANCE, OHIO, Nov. 10—The General Body Manufacturing Co. has been incorporated in this city to take over the factory of the Defiance Motor Truck Co. and operate it for the production of bus, coach and other bodies. Behind the incorporation is the A. J. Miller Co. of Bellefontaine, Ohio, which started the manufacture of bus and coach bodies in the fall of 1922.

The smaller type bodies will continue to be built at the Miller plant in Bellefontaine, while the larger bodies will be handled at the Defiance plant.

Officers of the General Body Company are as follows: President and sales manager, S. N. Arni, Bellefontaine; vice-president and general manager, M. C. Harrold, Bellefontaine, and secretary-treasurer, J. F. Robertson, Defiance. John Gabriel, secretary-treasurer of the Miller company, is the additional member on the board of directors.

Dunlop Earnings Gain, Says Visiting Officer

NEW YORK, Nov. 13—Sir George Beharrel, managing director of the Dunlop Rubber Co., arriving here to inspect the plant in Buffalo, reports that earnings of the company should exceed last year's total of £1,250,000 after bond interest, sinking fund and depreciation. Dividends, he said, probably will be resumed if earnings continue at the present pace.

"The plants in England," he said, "are operating at full capacity and the outlook is very bright. The capitalization plan has been approved by the stockholders and the only thing lacking is ratification by the courts."

British Discuss Tax on Cubic Capacity

Proposed Change from Horse Power Unit Would Benefit Americans

LONDON, Oct. 27 (*by mail*)—The British motor industry is considering the merits of a proposition whereby taxation shall be based on cubic capacity, instead of on horsepower, at a rate of £1 per 10 cu. in. American cars represented in this market would benefit materially if this proposition is decided upon and eventually approved by the Treasury.

The annual tax on the Buick "20" would be reduced from £22 to £18 and on the Buick "27" from £28 to £24 under the proposals. The Cadillac would be reduced from £32 to £29; the Chevrolet from £22 to £16; the Chrysler from £22 to £19; the Cleveland from £22 to £20; the Dodge from £24 to £20; the Durant Rugby from £16 to £12; the Essex from £18 to £14; the Flint from £28 to £26; the Ford from £23 to £17.

The Kissel would be reduced from £27 to £25; the Lincoln from £37 to £34; the Maxwell from £21 to £18; the Moon from £24 to £18; the Overland from £19 to £14; the Packard Six from £28 to £26; the Packard Eight from £37 to £34; the Paige-Jewett from £26 to £23; the Paige Six from £34 to £30; the Reo from £25 to £23.

The Rollin would be reduced from £17 to £14; the 27.3 hp. Studebaker from £28 to £23; the 29.4 hp. Studebaker from £30 to £27; the 35.7 hp. Studebaker from £36 to £33; and the Willys-Knight from £21 to £18. The Gray, Hupmobile or Oakland would hardly be affected by the change.

Gear Company Occupies Larger Headquarters

DETROIT, Nov. 13—Republic Gear Co., organized as the replacement parts division of the Detroit Bevel Gear Co., has moved to a new location in Detroit. Its business had outgrown the facilities of its former headquarters.

The company was organized this year to handle the replacement business of the Bevel Gear Co. by H. N. Nigg, who is president and general manager. Mr. Nigg is also the organizer and general manager of the Bevel Gear Co. The directorate and officers of the two companies are the same. In its new location the replacement company will have 20,000 feet of office and warehouse space.

Officers and directors of the companies are: A. W. Russel, F. H. Blair, H. N. Nigg, J. S. Dages, E. H. Jenks and T. R. Nevin. In addition to Mr. Nigg, the active officers of the replacement company are J. S. Dages, vice-president in charge of sales, and E. H. Jenks, treasurer.

England Is Likely to Restore Tariff

Stanley Baldwin Said to Favor Putting Back of McKenna Duties

LONDON, Nov. 1 (*By Mail*)—Although it is unusual for a new British government of different politics from the one it succeeds to reverse an important decision arrived at while it was in opposition, there is a possibility that the new Conservative regime, with its record representation and majority in the House of Commons, may re-impose the McKenna import duties removed last summer at the instance of the Labor and Liberal parties in conjunction. One of these duties was the 33 1/3 per cent on imported cars.

During the election campaign the leader of the Conservative party and the Prime-Minister-to-be (Stanley Baldwin) said again and again that he was still in favor of protecting industries that needed protection by means of the McKenna duties and the safeguarding of Industries Act, even though a full tariff and the taxing of imported foods was not part of his policy.

Then, the new member of Parliament for Coventry—where the Labor M. P., who spoke in favor of the import duty on cars last spring and then refrained from voting against its removal was unseated—has asserted that he will do all he can and as soon as possible to have the duty reimposed, and there is reason for suggesting that he is by no means without influence in the Conservative ranks—he is viewed as one of the coming men.

If the Conservatives decide to reimpose the duties (finally removed on Aug. 1) they will have no difficulty in carrying the necessary measure through Parliament, for besides having over 200 majority in the House of Commons they can secure equally overwhelming support, if necessary, in the House of Lords, although if the proposal is embodied in a finance bill the upper chamber has no say in the matter. Everything depends upon whether the leaders of the party consider it expedient to reverse the decision of the late Parliament and Government.

Highway Association To Talk Over Traffic

NEW YORK, Nov. 13—The National Highway Traffic Association will hold its annual meeting in the new clubhouse of the Automobile Club of America, 12 East Fifty-third Street, this city, Dec. 3. Two sessions will be held, the first beginning at 2.30 p.m. and the second at 8 p.m. A dinner open to the public will be served at 6 o'clock.

SEES FARMER OUTLOOK GOOD FOR FIVE YEARS

CHICAGO, Oct. 28—The Committee on Agricultural Press of the American Association of Advertising Agencies has issued its annual report for the period ending October, 1924, in which it paints in glowing terms the sales opportunity existing in the farm field.

"There has been a general rise in the value of the products of the farm, with a decrease, or at least no increase, in the cost of manufactured goods the farmer buys," the report states in part. "His improved financial position is inevitable.

"You can look forward to the next five years, in the village and country market, as an era in which every manufacturer of every kind of commodity has possibilities of tonnage increases not duplicated elsewhere in the United States."

The following traffic problems will be presented for discussion by leading traffic and highway transport experts:

"Solutions of the Parking Problem in Congested Districts or Municipalities."
"Enforcement of Traffic Regulations by Utilization of a Police Traffic Bureau."
"Methods of Increasing Traffic Capacity of Streets."
"State Fees for Commercial Motor Vehicles operating as Private and Common Carriers."
"Advantages and Disadvantages of Compulsory Automobile Liability Insurance."
"Methods of Forecasting Future Traffic and the Saturation Point in the Utilization of Motor Vehicles."
"Regulation of Pedestrian Traffic."

A report will also be given by a committee of the association on "Weights, Dimensions and Speeds of Tractors, Trailers and Semi-Trailers."

Steam Plant for Ford at St. Paul Ready Dec. 1

ST. PAUL, MINN., Nov. 12—The steam plant for the new Ford Motor Co. factory at the Mississippi River high dam here will be ready to operate Dec. 1. Four 4500 k.v.a. hydroelectric generators have been operating several weeks for the Northern State Power Co., which is to have the excess electric power after the Ford plant begins operations.

The plant is ready for installation of machinery and S. A. Stellwagen, the manager, says operations will begin early in the spring.

The Minneapolis plant at Fifth Avenue N. and Fifth Street will be sold or utilized for other than assembly purposes.

CANADIAN FORD STOCK $460

NEW YORK, Nov. 12—The first sale of a full 100-share lot of Ford Motor Co. of Canada, Ltd., was made on the floor of the New York Curb Exchange Monday. The sale was at $460 a share. Previous transactions were in ten-share units.

Replacement Parts Association Formed

Manufacturers and Wholesalers Organize in Chicago

CHICAGO, Nov. 13—Permanent organization of the National Standard Parts Association, composed of about 100 manufacturers and wholesalers of automotive replacement parts, was effected in a three-day meeting at the La Salle Hotel this week.

Besides providing a vehicle of national scope through which to work for improvement of the automotive replacement parts trade, the association outlined a program of cooperative effort designed to promote the more efficient, effective and profitable distribution of standard replacement parts. The details of this activity were assigned to a standardization and merchandising committee.

To Collect Data

One of the early activities of the association through this committee will be the collection of data concerning standards by which the quality of replacement parts, accounting methods, stock control methods and means of minimizing obsolescence may be judged. Reports containing the committee's recommendations on these subjects will be issued to the members from time to time.

The association will establish permanent headquarters in Chicago about Jan. 1 in charge of C. B. Fraser, secretary.

The program of the association also calls for the holding of a show in Chicago in November, 1925, in conjunction with the annual convention. The show will be open to the trade and will include exhibits of standard replacement parts, tools and garage equipment.

A significant phase of all of the convention's deliberations and activities was the emphasis placed on the word "standard," which has been made a part of the name of the organization. It was the sense of the meeting that only such products may be regarded as "standard" which are made by reputable concerns, are trade-marked, supported by a definite sales policy and are of good quality.

Piracy Condemned

In its code of fair trade practices, also adopted at this meeting, the association specifically disapproves any form of piracy "particularly the practice by which one manufacturer duplicates in trade-name, design, color or construction the product of another to such an extent that the buyer or the public is deceived as to the name of the manufacturer or the brand of the article."

The N. S. P. A. elected as its first president A. T. Haugh, vice-president of the King Sewing Machine Co., Buffalo.

Arcadia Trailer Corp. Put in Receivership

Voluntary Bankruptcy Petition Filed, with Reorganization in View

ROCHESTER, Nov. 11—The Arcadia Trailer Corp. at Newark, N. Y., has filed a voluntary petition in bankruptcy in the United States District Court. Judge John R. Bazel has appointed B. C. Williams, Newark attorney, as receiver.

In its petition the company lists liabilities at $181,740, assets at $429,335 and secured claims at $65,837.

According to officers of the corporation the step was taken to conserve the assets until reorganization can be effected. The action was forced by lack of working capital and not by lack of business they said. This they say has prevented them from enlarging their plant to take care of increased business.

As a result, according to the officers, during the last three years nearly as much business has been turned away as was accepted. Business for the month of October was the best for that period in the history of the company. So far as is known no legal claims are being pressed against the company at this time.

Officials claim future business outlook for the corporation the brightest since the war and hope through the temporary receivership to get enough working capital to handle it.

The company was incorporated in Delaware in April, 1920, to manufacture heavy duty trailers, motor truck bodies and "Birdsall" traction engines. Its authorized capital stock is 60,000 shares of common of no par value and $400,000 8 per cent cumulative preferred; outstanding, 43,000 shares common and $289,263 preferred.

John H. Fertig is president and the other officers are: Wilson M. Gould, vice-president; Frank D. Burgess, secretary, and Ernest V. Pierson, treasurer. The directors are the officers and Ross S. Bush.

Mexican Commission to Visit New York Show

NEW YORK, Nov. 12—A Mexican commission composed of 20 automobile dealers and persons interested in highway transportation will attend the Silver Jubilee Automobile Show in this city, Jan. 2 to 10, on invitation of the National Automobile Chamber of Commerce. Meetings are now being arranged by the Foreign Trade Committee of the Chamber for the discussion of questions pertinent to automobile conditions in the Republic.

While here the visitors will have an opportunity to meet with highway authorities and investment bankers of the United States and discuss with them practical means of developing and financing road construction in Mexico.

Business in Brief

Written exclusively for AUTOMOTIVE INDUSTRIES *by the Guaranty Trust Co., second largest bank in America.*

NEW YORK, Nov. 12—The principal feature of last week's markets was the great increase in trading on the Stock Exchange following the election. The number of shares traded on Friday was the largest in five years, and the week's total was 8,058,070 shares, as compared with 4,451,346 in the corresponding week last year. Many commodity markets also reported gains in the volume of trading, although commodity prices showed no general upward movement.

The preliminary estimate of the corn crop by the Department of Agriculture places the total yield at 2,477,538,000 bushels, which compares with an average of more than 3,000,000,000 bushels for the last four years. The yield per acre is estimated at 23.5 bushels, as against 29.2 bushels last year, and the merchantable quality at 63.2 per cent, the lowest in 30 years.

The production of pig iron in October amounted to 2,477,127 tons, comparing with 2,053,264 in September and 3,149,158 in October, 1923. The average daily output was 79,907 tons, as against 68,442 in the preceding month and 101,586 a year earlier.

The production of steel ingots totaled 3,111,452 tons, which compares with 2,814,996 in September and 3,577,091 in October last year, while the daily average of 115,239 tons compares with 108,269 in the preceding month. Unfilled orders of the United States Steel Corp. on Oct. 31 amounted to 3,525,270 tons, as against 3,473,780 at the end of September and 4,672,825 on Oct. 31, 1923.

Car loadings in the week ended Oct. 25 reached a new high mark, numbering 1,112,345, or 38,504 more than in the corresponding week last year and 10,009 more than the previous high record of the preceding week. Loadings of grain and miscellaneous freight were also the largest in history.

Fisher's index of wholesale commodity prices stood at 150.9 last week, comparing with 151.5 for the preceding week and 151.3 two weeks earlier. Dun's wholesale price index on Nov. 1 stood at 193,-734, reflecting an advance of 1½ per cent during October. The rise in Bradstreet's index during the month was 2.7 per cent.

Firestone Tire Buys Sanford Cotton Mills

Fabric for Akron and Massachusetts Plants to Be Made There

AKRON, Nov. 13—Acquisition of the Sanford Cotton Mills, Fall River, Mass., one of the largest textile manufacturing units in the country, places the Firestone Tire & Rubber Co. on a close footing with other large American corporations which control a large part of the raw materials used in the manufacture of their finished products.

Announcement of the purchase of the Sanford Mills, and the incorporation of Firestone Cotton Mills in Boston to take over their operation as a subsidiary of the parent company was made by Harvey S. Firestone, president of the Firestone Tire & Rubber Co.

Firestone Mills is capitalized at $5,-000,000. Bernard M. Robinson is president, Rogers F. Beacon of Boston treasurer, and G. C. Carkhuff secretary. Mr. Robinson and Mr. Carkhuff are officials of the Firestone company and residents of Akron.

Practically all the tire fabric used by the two Firestone Akron plants, which have a combined output of approximately 25,000 tires a day, the tire manufacturing subsidiary in Canada, and the Firestone rubber footwear factory in Massachusetts will be produced by the Fall River textile plant, according to officials.

The Sanford mills, which are in the center of the New England textile industry, are well equipped. The buildings were erected about four years ago at a cost of nearly $4,000,000.

With its new textile plants, crude rubber plantations and rim plant, Firestone now has a commanding position in the tire manufacturing industry. A special "automatic" plant for small size automobile tires also enables the company to produce these tires at a lower cost than most competitors.

Goodyear and Fisk Buy Rotch Mill

BOSTON, Nov. 13—The Goodyear Tire & Rubber Co. and the Fisk Tire Co. jointly are reported to have purchased the Rotch Mill of the American Cotton Fabric Co. of New Bedford. Whether the newly acquired property will be operated as a unit for the account of both companies or a physical division made is not yet determined. The mill manufactures cotton yarn for tire fabric.

G. M. C. SAFETY SERIES

DETROIT, Nov. 12—As a part of its contribution to public safety, General Motors Corp. has started distribution of a weekly series of articles dealing with various phases of the subject. At least 25 articles will be included in the series, all of them written by A. B. C. Hardy, president of the Olds Motor Works.

MEN OF THE INDUSTRY

Chapin to Help World Survey

Roy D. Chapin, president of the board of the Hudson Motor Car Co., has been appointed a member of the American committee of the International Chamber of Commerce, which will conduct an economic world survey as a supplement to the Dawes plan. The survey will be preliminary to the Brussels meeting of the Chamber, to be held during the coming year, at which the report of the committee will constitute the basis of discussion of the general problem of economic restoration by the business interests of the 39 countries represented in the Chamber's membership.

Main Will Make Accessories

J. Harry Main, member of the purchasing division of the General Motors Corp. advisory staff, has resigned to enter the accessory manufacturing field. The resignation is effective Dec. 31, at which time Mr. Main will announce the details of his new project. Mr. Main is one of the best known men in the purchasing branch of the industry. He was for many years purchasing agent for the Cadillac Motor Car Co., leaving this position to accept the appointment as head of the purchasing division of the advisory staff.

Pulcher Returns from Europe

M. E. Pulcher, member of the Motor Truck Committee of the National Automobile Chamber of Commerce, has returned from extended conferences with automotive representatives abroad. He reports that the demand for light motor vehicles is most promising in Europe and that increasing demand will accompany improved economic conditions.

Gov.-Elect A. T. Fuller Sails

Lieut.-Gov. Alvan T. Fuller, Packard distributor in Eastern New England, who has been elected Governor of Massachusetts, sailed for Europe this week for a brief vacation.

Parnell Goes to England

Wallace R. Parnell, advertising manager of the Boyce & Veeder Co., is in England arranging for British distribution of Boyce-ite. An extensive campaign throughout the British Isles is under way as part of the plan to put the product before the British public. Mr. Parnell expects to return some time this month.

Fokker Here to Promote Aviation

H. G. Fokker, the Dutch airplane manufacturer, upon arriving in New York Tuesday from England, stated that the United States Government had contracted with him to construct 100 planes for military purposes at the Atlantic Aircraft Co. plant at Hasbrouck, N. J., which has a capacity of 300 machines a year. He said the planes to be built for the Government are to be reconnoissance machines of 30-ft. wing expansion, capable of a speed of 170 miles per hour. Mr. Fokker said the Government should subsidize aviation. He is interested in the promotion of a commercial company in the United States to handle 100 planes in carrying mail and passengers between cities.

Dr. Franklin Back from World Tour

Dr. M. W. Franklin, general service manager of the General Motors Export Co., has returned from a trip around the world highly optimistic over the future of the motor car export business. With the general improvement of roads and the great demand for transportation, he says, the automobile is proving a greater necessity than ever. He reports the increasing use of motor vehicles, particularly in the Far East, Australia, New Zealand, Strait Settlements and South America.

G. M. Delivered 45,479 Units During October

NEW YORK, Nov. 13—Deliveries of General Motors units by dealers to consumers in October totaled 45,479 cars and trucks, as compared with 58,173 in the corresponding month a year ago and with 48,568 in September of this year, according to the monthly statement of the corporation.

From Jan. 1 to the end of October 588,783 cars and trucks were delivered by dealers to ultimate users, as against 646,310 in the corresponding period last year, a decrease of 8.9 per cent.

The following tabulation shows sales of G. M. cars and trucks by dealers to ultimate consumers, as well as sales by manufacturing divisions of the corporation to their dealers:

	1924		1923	
	Sales to Users by Dealers	Sales by G.M.C. to Dealers	Sales to Users by Dealers	Sales by G.M.C. to Dealers
Jan.....	33,295	61,398	30,464	49,162
Feb.....	50,008	78,668	41,448	55,427
March..	55,845	75,484	74,137	71,669
April....	89,610	58,600	97,667	75,822
May.....	84,686	45,965	89,317	75,393
June....	66,146	32,984	75,952	69,708
July.....	60,275	40,563	63,209	51,634
Aug.....	54,871	48,614	55,832	65,999
Sept....	48,568	51,951	60,111	69,081
Oct.....	*45,479	*49,034	58,173	86,936
Total	588,783	543,261	646,310	670,831

*These preliminary figures include Buick, Cadillac, Chevrolet, Oakland, Oldsmobile passenger and commercial cars and GMC trucks sold in the United States, Canada and overseas.

Reo Adds Two Sedans and Coupe to Its Line

DETROIT, Nov. 13—Reo Motor Car Co. has added two new five-passenger sedans listing at $1,595 and $2,085, respectively, and a four-passenger coupe at $1,975 to its line of passenger cars.

All three models are mounted on the standard six-cylinder 120-in. wheelbase chassis and are equipped with 32 x 6.20 balloon tires and steel disk wheels.

Time Notes Show a Steady Decline

Decrease Revealed in N. A. C. C. Survey Is Attributed to Lower Automobile Prices

NEW YORK, Nov. 13—A steady decline in the average of automobile time payment notes outstanding is shown in a survey of finance companies covering a period of years, as made by the National Automobile Chamber of Commerce. In 1923 this average was $252, compared with $276 in 1922, $299 in 1921 and $377 in 1920. The decline is attributed to the lower prices of automobiles today, as compared with 1920, and to the tightening of credit risks by finance companies and dealers.

The survey shows that the average note at time of purchase on new passenger cars declined from $810 in 1920 to $695 in 1921, to $612 in 1922 and $587 in 1923. Truck paper declined from $1,145 in 1920 to $765 in 1923. The average note on used passenger cars at the time of purchase in 1923 was $303 and on used trucks $374.

Companies reporting on the item of losses during 1923 purchased automobile paper aggregating $193,559,569, of which $362,432, or less than 1 per cent, was stricken off as loss. A considerable number of the companies doing business on the dealer indorsement plan report no losses.

Accounts 30 days past due on Dec. 31, 1923, as reported by 36 finance companies doing business of $230,617,464, amounted to $798,750, or 35/100 of 1 per cent. The same companies on that date had notes 60 days past due aggregating $451,900, or 19/100 of 1 per cent. Notes held by these companies past due on Dec. 31, 1923, totaled $3,152,441, or the equivalent of 1.36 per cent.

The total volume of retail business transacted in 1923 by 50 finance companies, which comprises practically all the large concerns, was $281,079,250.

20 Per Cent Increase in Continental Net

DETROIT, Nov. 13—An increase in net profits of approximately 20 per cent over last year is expected to be shown by the Continental Motors Corp. with the closing of the present fiscal year.

In speaking of the year's business, W. R. Angell, vice-president of the company, says:

While, of course, it will be several weeks before the auditors have completed the annual statement, from all indications the company will show a satisfactory increase in profits over last year although our sales were slightly less. Our cash position is the best in our history.

Through reductions and inventory and through various economies effected, we have been able to materially increase the ratio of our current assets to current liabilities. This ratio is now approximately 11 to 1

Standard Financing Movement Started

Action Taken to Curb Tendency Toward Credit Over-Extension in Sales

CHICAGO, Nov. 13—Concerted action is being taken by bankers and automobile financing companies, as a result of a meeting held in this city, to curb a tendency to over-extend credit in the sale of automobiles and to adopt standard practices which would govern the business relations between financing company, dealer and buyer. If the recommendations made at the meeting are generally accepted, sales by dealers would be placed definitely on a basis of 33 1/3 per cent down, the balance to be distributed in 12 equal monthly installments.

The meeting was called for the reason that the more conservative financing companies had recently advised their bankers that the period for payment had been extended by some of their competitors to 16 or more monthly payments and that the down payment had been reduced to 25 per cent or less. In some instances payments are not even required in equal monthly installments, it was said, but a large proportion of the total due is left for the final payment.

To Canvass Companies

To bring a halt to such practices, a continuance of which, it was believed, would undermine the sound basis of automobile financing, a committee of bankers and representatives of the acceptance companies adopted resolutions providing for the appointment of a committee of seven, taken from the leading automobile finance companies, to canvass the companies doing an automobile financing business, with a view of obtaining a positive agreement that they would limit their purchases of automobile paper to that which does not exceed 12 monthly payments.

The resolutions also provided that the minimum down payment on all new passenger cars financed should be one-third of the cash selling price at point of delivery, including accessories and equipment. On used cars the minimum down payment should be 40 per cent of the sale price of the car, this price not to exceed a price based upon some recognized authority, and the maximum time for payments should be limited to 10 months, or, if preferred, the down payment should be 50 per cent of the sale price, the balance to be paid in 12 equal monthly installments.

Semi-Annual Audit

The committee also approved a proposal to the effect that the finance companies should have an audit made semi-annually or oftener by some company satisfactory to the bankers, and that this auditing company should have submitted to it a questionnaire agreed upon by bankers and automobile finance companies covering especially the methods followed by the finance companies examined.

Agreement was also made on the proposal that a joint committee of bankers and automobile finance companies should publish a pamphlet, setting forth the decisions reached at the various meetings, for circulation among every bank and trust company in the country located in towns of a population of 10,000 or more and also to every automobile financing company and automobile manufacturer.

The committee which adopted the resolutions was composed of the following representatives of acceptance companies: Henry Ittleson, Commercial Investment Trust, Inc., New York City; A. E. Duncan, Commercial Credit Co., Baltimore; A. E. Brooker, Securities Investment Co., St. Louis; W. G. Tennant, Tennant Finance Corp., Chicago; E. M. Morris, Associates Investment Co., South Bend, Ind.; J. L. Little, National Bond & Investment Co., Chicago; and T. C. McMillan, First Acceptance Corp., Milwaukee.

Bankers on the committee included:

Arthur W. Newton, First National Bank of Chicago; W. W. Smith, First National Bank in St. Louis; Robert O. Lord, Harris Trust & Savings Bank, Chicago; John E. Blunt, Jr., Illinois Merchants Trust Co.; E. E. Barber, Continental and Commercial National Bank; Fred Brown, First National Bank, Detroit; and Arthur G. Cable, Guaranty Trust Co., New York.

Conference to Discuss Motor Transportation

BOSTON, Nov. 13—In cooperation with New England organizations representing motor vehicle users, the National Automobile Chamber of Commerce will sponsor a New England Motor Transport Conference in this city Dec. 11-12, for the purpose of discussing highway transportation problems of that section.

Railroad men and trolley officials will be among the speakers. Special sessions of the conference will be devoted entirely to the discussion of the use electric railways are making of the motor bus and the extent to which railroads are solving, with the motor truck, the problem of handling local less-than-carload freight.

Development of a network of intercity motor coach operation will be discussed, as will the commercial value of New England's new highway system and the value of the automobile in helping to reclaim deserted farms. Safety and highway congestion questions will also be taken up for discussion.

Invitations have been extended to State highway officials, mayors, city planning experts and shippers in addition to members of automobile organizations, railroad men and electric railway representatives.

FRANKLIN SALES INCREASE

SYRACUSE, N. Y., Nov. 10—Franklin Automobile Co. reports an increase in retail sales during October of 11 per cent over September, with shipping order for November in excess of October.

Farmers of Canada in Sales Contest

Three Owners in Each Township Start Out for Prizes

FORD CITY, ONT., Nov. 13—Ford Motor Co. of Canada, Ltd., is instituting a farmer-owner contest, by which it authorizes three farmers in each township throughout the Dominion to sell Ford vehicles. Prizes to those selling the most cars, trucks or tractors in each district are a completely equipped Tudor sedan for the winner and a fully equipped tractor to the runner-up. The contest will continue until the end of the year.

Only three farmers in each township or parish will contest for the prizes. The three selected in each case will be the first three to enroll with the company. Each contestant must already be the owner of a Ford vehicle, either car, truck or tractor. During the term of the contest the farmers selected are fully authorized Ford agents, the deliveries, however, being made by the regular authorized dealers in each district. All contestants will receive, in addition to the prizes, a cash award amounting to 3 per cent of his total sales.

In originating the contest, the Ford company aimed to enroll only present Ford owners, so that they might stress their own personal experience and satisfaction with Ford vehicles. The best recommendation for a sale, the company feels, is the word of a satisfied user. Coming after the harvest, the activity of contestants will not interfere with their regular farm duties, but instead will provide an opportunity of increasing the usual year's earnings.

The enrollments for each township are being made at the respective branch offices of the company throughout the Dominion. Only a small number of districts have failed to register their representatives.

Ford Foreign Sales Make a New Record

DETROIT, Nov. 13—Sales of Ford cars, trucks and tractors in foreign countries for the first nine months of the year exceeded those of any similar period in the history of the company. The figure for cars and trucks during this period was 128,291 and the tractor total was 10,303. The totals do not include shipments from the Ford Motor Co. of Canada, Ltd., which supplies Ford products to all parts of the British Empire, except the British Isles.

Argentina leads the export field in the purchase of Ford cars, having taken approximately 16,000 since the first of the year—a considerable gain over the first three quarters of last year. Exports of trucks for the three-quarter period exceed by 13,000 the total during the same period last year.

G. M. Offers Stock to Employees at $99

Right Given to Subscribe to 7 Per Cent Preferred in Installments

NEW YORK, Nov. 13—General Motors Corp. and its subsidiaries are offering their employees the right to subscribe to the 7 per cent preferred stock of the corporation at $99 a share, in amounts from one share up to ten shares, based upon the wages of the employee. Subscription books open Dec. 1, 1924, and close Feb. 28, 1925. Payment may be made in cash, or in 11 equal monthly installments of $9 a share during 1925.

Employees buying the stock will receive direct the full amount of dividends paid, $7 a share a year. Those subscribing on the partial payment plan will also receive their dividends direct, but will be charged 6 per cent interest on unpaid balances.

As an inducement to subscribers to remain with the corporation, an extra payment of $2 a share a year for five years, commencing Feb. 15, 1926, will be made to subscribers under this plan, in addition to the regular dividend of $7 a share a year.

Under the stock subscription plan of last year there were 3355 employees who subscribed for 10,993 shares of stock. This year it is anticipated that a still larger number of employees will avail themselves of the right to participate.

To Distribute Cash and Stock

NEW YORK, Nov. 13—Distribution of cash and new stock will be made by the General Motors Corp. and its subsidiaries to more than 8200 employees shortly after the end of the year. The distribution has been provided under an investment plan of the corporation, set up for the benefit of employees.

The cash amounts to $1,036,000 and the stock consists of 23,000 shares, which at current market prices are worth $1,364,000. This total of $2,400,000 is the participation of the 8200 employees in the savings and investment fund, Class of 1919, into which they paid $760,000 from their wages and have left with the corporation for a period of five years. The distribution, therefore, represents better than $3 for $1 paid into the fund by employees.

The savings fund was organized in 1919, and every year since then a new class has been formed, each maturing in five years. Employees are given the right to pay into each class as it is formed 10 per cent of their annual wages, not to exceed $300.

On its part the corporation agrees to put into an investment fund, which is credited to the employees over a period of the subsequent five years, 50 cents for each dollar paid into the savings fund by the employee. Interest is compounded semi-annually at the rate of 6 per cent per annum. Employees have the right to withdraw their money at any time, but, to derive the full benefits, it is essential to leave the money in the fund until the end of the five years when the class matures.

Under the present operation of the plan, the corporation insures employees a minimum return of better than 20 per cent a year over the five-year period. At the present time 55 per cent of those eligible are participating in the plan, the number being 28,000 employees located in the plants of the corporation and its subsidiaries, operating in 38 States of this country and Canada.

New Flint Roadster Ready for Delivery

NEW YORK, Nov. 12—A new Flint roadster is now ready for delivery. It is of the four-passenger type with a seat for the two extra passengers folding into the rear deck. Color options of two tone combinations in brown, green and gray are given, the blending of the tones in harmonious curves being one of the features of the model. The finish is high luster varnish.

The equipment includes all nickel fittings, bumpers front and rear, 6 x 20 in. balloon tires, disk wheels and a new type tire carrier with three metal straps. Large nickel headlamps are used. The price has not yet been announced, but it is expected to be less than $2,000 and something over the price of the two-passenger roadster, which is $1,630.

Reo Closed Model Sedan Brought Out at $1,595

DETROIT, Nov. 13—The Reo Motor Car Co. has brought out a new five passenger closed model which will be known as the twentieth anniversary sedan. The new body is mounted on the standard six cylinder passenger car chassis and is priced at $1,595.

It is a four door type finished in dark blue white striping and upholstery to harmonize with the exterior color equipment; includes balloon tires, disk wheels, one piece windshield, windshield wiper, rear view mirror, parking lamps, dome light and sun visor.

Ford Brings Test Case to Prevent Use of Name

WASHINGTON, Nov. 13—The Ford Motor Co. has applied to the District Supreme Court here asking for a restraining order against Charles H. Chidakel, dealer in automobile accessories, to prevent further alleged unauthorized and unlawful use of the word "Ford" on his show window.

The company declares that an automobile or accessory dealer has no right to the use of the word "Ford" unless it is specifically authorized. The suit is in the nature of a test case and will effect a great many dealers throughout the country.

Bureau to Handle Removals by Truck

Increased Use of Motors Results in Inter-City Organization

CHICAGO, Nov. 13—Founded on the development and great advance in the use of the motor truck for household removals, an Inter-City Removals Bureau has been established here by the National Furniture Warehousemen's Association, comprising 714 household goods warehouse companies in the United States and Canada.

The new bureau is a cooperative agency for developing a system of providing "two-way loads" for the members of the association. In its relations with the public the phrase "return loads" will be banished from warehousing terminology, and the rate charged for the so-called return load will be equal to the tariff on the original load.

The purpose of the bureau is to act as a clearing house for orders on intercity and long distance removals of household goods. For the present operation of the agency is confined to the association's central division—the States of Iowa, Wisconsin, Illinois, Michigan, Indiana, Kentucky and Ohio.

To Notify by Telegraph

Every N. F. W. A. member having a long distance load is expected to notify the bureau here by telegraph, giving particulars as to size of load, date when load must be moved, and destination. In this way the bureau plans to supply loads for trucks which otherwise might be empty on return journeys. On the return journey the warehouse company operating the truck will receive 60 per cent of the money paid by the customer.

For the present the bureau will make no attempt to fix rates for either of the two-way loads. The current regular tariffs which prevail in the various territories will be quoted. As the system of two-way loads develops customers will be given some benefit in lower prices, these to be made possible, it is anticipated, through decreased costs by reason of vans not running empty on return journeys.

Henry Reimers, the association's executive secretary, in a statement says:

> The popularity of the motor truck as a means of transportation in inter-city removals within a radius of 300 miles is an actual condition plainly evident. The freight shipment, with its need for costly packing, is steadily losing in its competition with this newer and more desirable method for the transportation of household goods.
>
> The result has been, for warehousemen, a loss of packing revenue. Warehousemen must find a means to develop these two-way loads in order that the net revenues from inter-city cartage will provide an appreciable substitute for the shrinkage in packing revenue from the passing of the freight shipment.

FINANCIAL NOTES

White Motor Corp. has purchased the entire issue of $2,500,000 White Motor Securities Corp. 7 per cent cumulative preferred stock and is offering it to stockholders of record Nov. 12 at par, payable 20 per cent with application and 80 per cent on or before Jan. 3, 1925. Stockholders may make application in excess of their pro rata quota, which is equal to 10 per cent of the $50 par value of White Motor stock. Allotments will be made at the discretion of the directors. The remaining unissued preferred and the entire 25,000 shares of common will be held for future requirements. White Motor Securities Corp. has an authorized capital of $5,000,000 preferred and 25,000 shares of no par value common, the latter with a stated value of $500,000.

American LaFrance Fire Engine Co. is offering common and preferred stockholders of record Nov. 14 the right to subscribe to new $1,000,000 7 per cent cumulative preferred stock at $100 a share in the ratio of $16 worth for each share of preferred held and $1.60 worth for each share of common held. It is stated that business of the company has expanded so rapidly that the additional capital is necessary to take care of the expansion.

General Motors directors have declared for the fourth quarter of 1924 a dividend of $1.25 a share on the new common stock, payable Dec. 12 to stock of record Nov. 17, 1924; also quarterly dividends of $1.75 a share on the 7 per cent preferred, $1.50 a share on the 6 per cent debenture and $1.50 a share on the 6 per cent preferred, payable Feb. 2, 1925, to stock of record Jan. 5, 1925.

Industrial Acceptance Corp. 7 per cent cumulative first preferred stock to the amount of $4,000,000 is being offered at $100 a share by Edward B. Smith & Co., Howe, Snow & Bertles, Inc., and R. F. Devoe & Co., Inc. The corporation will continue the automobile acceptance business conducted since 1919 by a predecessor company under contract for the Studebaker Corp.

Marlin-Rockwell Corp. and subsidiaries for the quarter ended Sept. 30 show net loss of $6,836 after expenses and depreciation. The consolidated income account for the quarter shows gross earnings of $214,089, and operating profit, $99,191.

Borg & Beck Co., for nine months ended Sept. 30, reports net earnings of $202,327 after all charges and Federal taxes. This is equivalent to $2.02 a share earned on 100,000 shares of no par capital stock outstanding.

Firestone Tire & Rubber Co. has declared the regular quarterly dividend of 1¾ per cent on the 7 per cent preferred stock, payable Nov. 15 to stock of record Nov. 1.

Motor Wheel Corp., Lansing, Mich., has declared the regular quarterly dividend of 2 per cent on the preferred, payable Nov. 15.

New Era Spring & Specialty Co. has declared a stock dividend of 100 per cent, payable Dec. 1 to all common stockholders of record of Nov. 15.

Mengel Co. has declared the regular quarterly dividend of 1¾ per cent on the preferred stock, payable Dec. 1 to stock of record Nov. 28.

Good Weather a Boon to Tire Manufacturers

AKRON, OHIO, Nov. 13—Continued good weather during the fall months, with prospects of lasting well into November, has proved a boon to tire manufacturers. An unusually large number of tourists on the roads and an increase in the number of motor vehicles in active use has been reflected in an immediate increased demand for tires, according to officials of local plants.

Stocks in dealers' hands are reported to be low, and there has been a good demand for original equipment from motor car manufacturers.

W. O. Rutherford, vice-president in charge of sales of the B. F. Goodrich Co., reports that sales of that company are better at this time than during any similar period for several years.

Although the last quarter of the year is not expected to be as good as the previous quarter, owing to the recent reduction in tire prices and the high cost of crude rubber, Goodrich probably will earn between $8 and $9 a share in 1924 on its common stock. More efficient operation and rigid economy have enabled the company to show a large reduction in overhead expense.

With only $2 a share remaining in accrued dividends on the preferred stock, stockholders of the Miller Rubber Co. are anticipating favorable dividend action on the common stock early in 1925. It is believed Miller will show earnings of between $15 and $20 a share on the junior issue for 1924. Volume of sales have been better than last year.

Directors of the company have declared the regular preferred dividend of 2 per cent for the quarter, and an additional 1 per cent in accrued dividends on the preferred, both payable Dec. 1, to stock of record Nov. 10.

Belgium Makes Changes in Its Import Duty List

PARIS, Nov. 4 (*By Mail*)—Some changes were made in Belgian import duties from Nov. 10. Chassis weighing 1300 kilos (2866 lb.) and less, as well as complete cars weighing 1800 kilos (3968 lb.) and less, pay 576 francs per hundred kilos. Complete cars weighing 1900 kilos (4188 lb.) and chassis weighing only 1400 kilos (3086 lb.) pay 640 francs per hundred kilos.

The same rates are applied to either chassis or complete vehicles intended for passenger service with a weight of 2000 to 4000 kilos. For trucks coming within these weight limits the rates are 336 francs per hundred kilos. With a weight of 4000 kilos and over the import duty is 240 francs per hundred kilos.

All accessories pay 15 per cent ad valorem. Finished spare parts pay 640 francs per hundred kilos and unfinished parts 12 per cent ad valorem.

REHBERGER MARKETS BUS

NEWARK, N. J., Nov. 11—Arthur Rehberger & Son of this city is marketing a bus chassis with a six-cylinder Buda engine of 4 in. bore and 5⅛ in. stroke. This is known as Model B-2 and, except for the engine, is similar to the four-cylinder chassis known as model B-1, recently described in AUTOMOTIVE INDUSTRIES.

FREDERICK J. COOLEY DIES

WINDSOR, VT., Nov. 13—Frederick J. Cooley, vice-president of the Wilson Foundry Corp. of this city, died at the Mary Hitchcock Hospital in Hanover, N. H., last week. At one time Mr. Cooley was a motor truck dealer in Boston, where he represented the International and later the Kelley company, and in Oklahoma City, where he managed the sale of Kelley trucks throughout the State.

G. M. Not to Reduce Prices on Products

President, in Statement on General Outlook, Sees No Reason for a Decrease

NEW YORK, Nov. 13—That there will be no reduction in prices of General Motors products is indicated in a statement issued by President Alfred P. Sloan, Jr., today, in connection with the general outlook for next year.

Mr. Sloan believes that business in 1925 as measured by sales of cars to consumers will be at least equal to this year.

"As to the trend of prices," he says, "I cannot see any justification of any price reductions. Certainly, material will not be any lower—if anything higher.

"I see no possibility of a reduction in the cost of living that would justify any considerable lowering of the wage scale. It is a matter of record that present prices reflect a close margin of profit to the manufacturer, and the dealer's position we all know. From the standpoint of the public the real worth in present cars is greater than at any previous time in the history of the industry. I believe that manufacturers who reduce prices in the hope of getting business from competitors are going to be disappointed. General Motors is not going to take that position."

Flint Varnish Works Made duPont Unit

DETROIT, Nov. 12—The name of the Flint Varnish & Color Works is to be discontinued and the plant is to be operated in the future as a unit of the chemical division of E. I. Dupont de Nemours & Co. Stock of the varnish company was taken over by the Dupont interests in 1918, but up to the present time it has been operated as a separate corporation under the original name and as a part of the paint division of the parent corporation. In making the change the original corporation is simply dissolved.

Coincident with the change it is announced that the plant in the future will manufacture Duco, in addition to carrying on with its present line of automobile paints and varnishes. With the manufacture of Duco added it is expected that the capacity of the plant will be doubled.

W. J. Schlinger, in addition to his duties at the Flint plant, will become manager of automotive sales for the chemical products division of the parent corporation, with headquarters in Flint.

DU PONT MOTORS TO MOVE

WILMINGTON, DEL., Nov. 13—Du Pont Motors, Inc., manufacturer of the Du Pont Automobile, will move its works from Moore, Pa., to Wilmington, according to E. Paul Du Pont, president.

METAL MARKETS

While the tone of the steel market shows decided improvement, growth in the volume of demand is rather slow. Fractional advances in the heavier steel products reflect not so much heavier sales (although somewhat broader inquiry is noted), as they do better morale on the part of sellers. Sheet mills have come in for quite a few orders that buyers had postponed placing until after election. On the whole, however, there has been little change in the character of automotive buying.

Heavier commitments from passenger motor car builders are not looked for until a clearer view of the 1925 demand is in sight. The complexion of the steel market from now on is likely to be affected chiefly by the rate at which the railroads, structural steel users, machine builders and other consumers of heavy steel will contract. It is a foregone conclusion that railroad consumption of steel will increase impressively from now on.

It is on this quasi-certain development that the newspaper headlines proclaiming expectation of higher prices by the industry are built. Structural steel demand is also likely to show a relatively high rate because of considerable winter construction in the larger cities and especially because there is still a considerable unsatisfied demand for industrial and manufacturing buildings calling for much more in the way of steel than do ordinary dwellings, construction of which is beginning to catch up with the nation's needs.

The extent of the demand for steel from machine and machine tool builders depends upon the general industrial situation, and in this the requirements of the automotive industries will be the determining factor. The outlook for a gratifyingly adequate demand from all these consuming avenues is believed to be excellent by sales managers in the steel market not usually given to rainbow chasing. They honestly believe that the turn has come, but that it will be rather slow in making its full force felt. Automotive purchasing agents, therefore, will do well in considering the possibility that when they are obliged to come into the steel market with orders and specifications sufficiently heavy to care for the quickened rate of operations generally anticipated after the New Year, they will find its tone completely changed.

This does not necessarily mean that prices will soar to unreasonably high levels. No one, in fact, looks for such a condition, least of all the large steel producing interests, but the attitude of sellers toward buyers is likely to be quite altered. The weeks which immediately preceded election showed how abolition of the Pittsburgh plus base affects a steel market that is frail and flabby. It may not be many weeks before we shall learn its effect upon a market in which sellers can afford to be firm.

Pig Iron.—The market for foundry and malleable irons is fairly active with the price trend upward.

Aluminum.—To no market has the result of the election imparted support more directly than to aluminum. This is generally recognized in the market where prices rule firm.

Copper.—The market quieted down following some activity at fractionally higher prices immediately after the election. Producers believe that the price can now be held at around present levels.

3,786 Retail Deliveries in Detroit in October

DETROIT, Nov. 13—Retail car deliveries in Detroit during October totaled 3786, which compares with 4137 in September and with 4692 in October, 1923. Truck deliveries totaled 574, which compares with 581 in September and 484 in October, 1923. Closed car deliveries exceeded open cars more than two to one, the figures being 2528 to 1258.

Ford deliveries during the month were 1753, of which 1081 were open cars. The Ford total made up 46.3 per cent of total deliveries, which compares with 2324 or 49.5 per cent, in October, 1923. All low priced lines, including Ford, made deliveries of 2082, or 55 per cent of the month's business, which compares with deliveries of 3018, or 64 per cent, last year. Cars at or under $1,000 (including all low priced lines) made up 68 per cent of the October total, as against 72.7 last year.

Medium priced cars in October this year made up 28 per cent of the total, which compares with a 22.2 per cent figure last year. High priced cars held a percentage of 4, the same as in October, 1923.

Of the 574 truck total, 383 were Fords, with other light delivery vehicles making up a considerable part of the remainder. Several of the heavy duty manufacturers made important deliveries.

INDUSTRIAL NOTES

Ford Motor Co.'s Glassmere plant, by producing 733,000 square feet of finished plate glass in twenty-five working days in September, broke all previous records. This amount of finished, polished glass is the greatest ever produced in the same length of time by any similar factory in the world, the company states. The capacity of the plant is regulated by eight furnaces, each holding sixteen pots, each pot pouring 295 to 300 square feet a day. There are eight grinders and eight polishers. The entire output of the plant is used within the Ford industries.

Coast Tire & Rubber Co., Oakland, Cal., reports that since its reorganization demand for output has resulted in an extra force of men being employed at its plant. J. C. Hughes, president of the company, recently left for Southern California to visit newly appointed agents. His trip follows the first dividend ever declared by the company.

Paasche Air Crush Co., Chicago, has opened a Cleveland, Ohio, branch in the Perry Payne Building, that city, with H. W. Wivel in charge.

5 Per Cent Increase in Syracuse Business

SYRACUSE, N. Y., Nov. 13—New car sales in this city are about five per cent greater than for the same time last year, according to figures announced by the Syracuse Automobile Dealers' Association.

During the first nine months local dealers sold 7278 new passenger cars, compared with 6922 for the first nine months of 1923. Commercial car sales for the same period were 992 for this year and 934 for a year ago.

In the sale of passenger cars, only during the months of May and June were decreases from the previous year shown, and the same months in commercial car sales showed losses.

E. E. PEAKE DEAD

KANSAS CITY, Nov. 13—E. E. Peake, many years manager of the Kansas City Automobile Dealers Association and Show and one of the founders of the National Show Managers Association, died suddenly in Kansas City Friday. Mr. Peake resigned connection with dealer activities two years ago. After that he devoted his time to his real estate business.

Fuel Prices Hamper South African Sales

But, Nevertheless, Business Is Good—Dealers Disturbed Over Orphan Cars

JOHANNESBURG, SOUTH AFRICA —(*by mail*)—Oct. 13—The industry in South Africa is much concerned regarding the gasoline position. Rumors of overproduction in America, and a price war in England, have been heard, and the question is asked: "Why should not prices go down here?" The price paid here is about 70 cents a gallon, about 6 cents lower than in 1923. Undoubtedly it is the high price of fuel that is helping to hold back car sales. The dealers who are handling the well known makes of cars report that sales are quite good and steady, although cash is somewhat difficult to obtain.

Trade-In Situation Acute

The credit system in this country, if it can be dignified by the name of system, is a curse, and is hardly understood overseas. People seldom pay their ordinary garage accounts for service and gasoline under 45 days, and quite frequently 90 days' credit is demanded—and obtained. The position regarding trade-ins, of course, is somewhat acute, for 70 per cent of the purchasers of new cars have old ones to dispose of. Dealers are not falling into the trap of paying too much for used cars as often as they were wont to do, and consequently the garages are not, for the most part, overstocked with slow-moving merchandise subject to market depressions and fluctuations.

The English manufacturers are concentrating their attention more and more on the colonial markets and South Africa is in the limelight by reason of the fact that almost all the cars used are of American origin. Up to the present the fight has not been very severe, for the number of English cars that has come in has not been of any consequence. But there are signs that the battle will be waged more strenuously in the near future.

Morris Cars Liked

The Morris Cowley and Morris Oxford cars are becoming well known and appreciated, and it is thought that these two representatives of British mass production will continue to gain in popularity. Of course, there is no real need for concern on the part of the American manufacturers who have a tight hold on the car sales here, but the trend of events should be watched.

Not much has been heard of the 1925 models, for car stocks, unfortunately, are somewhat heavy, and there is little likelihood of some makes being seen in South Africa before January, 1925. The public is much interested in the coming

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Calendar

SHOWS

Dec. 1-13—Montevideo, Uruguay—Second Annual Motor Show, under the auspices of the Centro Automovilista del Uruguay, held in buildings of the Asociacion Rural del Uruguay.

Dec. 5-14—Berlin Automobile Show.

Jan. 2-10—New York, National Automobile Show, under the auspices of the National Automobile Chamber of Commerce, Bronx Armory. Open to the public except on Jan. 2 and 3 which are trade days.

Jan. 17-24—Cleveland, Annual Automobile Show.

Jan. 23-31 — Chicago, National Automobile Show, under the auspices of the National Automobile Chamber of Commerce, Coliseum and First Regiment Armory. Open to the public except on Jan. 23 and 24 which are trade days.

Jan. 25-31 — Chicago, Annual Automobile Salon.

Feb. 7-14—Kansas City, Mo., Annual Automobile Show.

Feb. 21-28—San Francisco, Pacific Annual Automobile Show.

March 7-14—Boston, Twenty-third Annual Automobile Show.

RACES

Nov. 24—Los Angeles.

CONVENTIONS

Nov. 18-19—Joint Service Meeting of the S. A. E. with the N. A. C. C. Cleveland, Hotel Winton.

Nov. 18-20—Akron, Ohio, Annual Convention of the National Tire Dealers Association.

Nov. 19—Annual Meeting, Motor Truck Industries, Inc., Detroit.

Dec. 3—Annual Meeting, National Highway Traffic Association, New York City.

Jan. 5—New York, Convention under the auspices of the National Automobile Dealers Association, Hotel Commodore.

Jan. 5-9—Chicago, Road Show and Convention of the American Road Builders Association.

Jan. 26-29—Chicago, Eighth Annual Convention of the National Automobile Dealers Association, Hotel LaSalle.

S. A. E. MEETINGS

Nov. 21—Chicago Section, Cold Weather Operation of Motor Cars. From the Electrical Engineer's Viewpoint, J. H. Hunt, General Motors Research Corp.; Cold Weather Operation From the Carburetor Engineer's Standpoint, O. C. Berry; Monadnock Building.

Dec. 11—Indiana Section, Aviation Development, Major E. L. Hoffman; Superchargers, Dr. F. A. Moss.

Dec. 15—Cleveland Section, Development of Clutches, Ernest C. Wemp, Long Manufacturing Co., Old Colony Club, Hotel Cleveland.

Jan. 15—Indiana Section, Lubrication and Crank Case Dilution, W. S. Sparrow of the U. S. Bureau of Standards.

Jan. 19—Cleveland Section, Preparation of Fuel Charges and Detonation, Arthur H. Denison, Weger Motor Co., Old Colony Club, Hotel Cleveland.

Jan. 20-23 — S. A. E. Annual Meeting, Detroit.

Feb.—Indiana Section, Automobile Finishes.

Feb. 16—Cleveland Section, Electrical Instruments and Measuring of Chassis Tests by Means of Them, J. H. Hunt, General Motors Research Corp., Old Colony Club, Hotel Cleveland.

Mar.—Indiana Section, Developments in Transmission.

Mar. 16—Cleveland Section, Road and Riding Ability, Harry Horning, Waukesha Motor Co., Old Colony Club, Hotel Cleveland.

Apr. 9—Indiana Section, Talk by F. E. Hunt, vice-president of the General Motors Research Corp.

Fuel Prices Hamper South African Sales

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of new models, and consequently all endeavors are being made to induce the press not to publish news of the 1925 cars until 1924 stocks have been cleared. The position regarding car stocks cannot be called serious, but is sufficiently absorbing to be unpleasant.

The latest car arrival is the Chrysler. There seems little doubt that this car will attract a great deal of attenion, for most people have heard about it and have read reports of it in the American papers. It should do well here, for its appearance is somewhat distinctive and the low build will no doubt attract people.

The new Cadillac (V-63) has been undergoing gasoline consumption tests throughout the country, and endeavors are being made to show people that the mileage it will do to the gallon is considerable. The Imperial gallon is about one-fifth more than the American, and results of 22 m.p.g. and over have been obtained. As the altitude in the Transvaal is between 4000 and 6000 feet, the results are mighty good. At the seacoast even more startling mileages have been obtained.

Chandler Models Arrive

The Chandler models for 1924 have only just made their appearance, and have created a favorable impression.

The motor industry seems a little concerned regarding orphan cars. News that another factory, the Columbia, has gone into the hands of a receiver has made a bad impression about assembled cars. Most of the cars manufactured in America are represented here, and there is hardly room for all of them. That is why the S. A. Motor Traders Association is not keen on encouraging importations of new makes.

The Buick dealers' conference took place in Johannesburg late in September, distributors from all parts of the country attending. The four Provinces and Rhodesia were represented and matters of importance regarding the franchise were discussed under the chairmanship of Arthur Williams, General Motors representative here, who had called the conference. It is getting near conference time, and others dealers will soon be meeting to talk over their business with one another. The spirit of cooperation is gradually growing in South Africa, and factory representatives are finding it much easier to get distributors to pull together. The conference of Automobile Clubs took place at Killarney, Johannesburg, recently and proved a very successful gathering.

The slogan of "We Want Good Roads" is still to be heard and seen throughout the country. There is no doubt that public bodies have been awakened to the real need for good roads, and there is some chance that the new Government will embark upon a real roads policy in 1925. At all events the campaign has resulted in placing the importance of good roads before the public.

M. Edward.

Traffic Accidents 14,000 in Nine Months of 1924

NEW YORK, Nov. 13—September was the worst month this year for traffic fatalities, according to figures compiled by the National Automobile Chamber of Commerce, which placed the accidents at 2100, increasing the nine months' total past the 14,000 mark. The actual number of fatal accidents recorded in the survey for September was 670 and for nine months 5498.

Subsidy Is Granted New British Truck

LONDON, Oct. 25 (*by mail*)—John I. Thorncroft & Co. has produced a 30 cwt. (3360 lb.) chassis, which has passed all the War Office tests enabling buyers to secure the annual subsidity of £40 per annum for three years. This makes approximately half-a-dozen British makes who have qualified thus far for the subsidy.

The new model has gone into production and deliveries are promised "shortly." Its catalog price is £480, which, minus the subsidy, entails an ultimate capital outlay of but £360. There is nothing strikingly unorthodox about the design. A four-cylinder L-head engine is used, 3¾ x 5 in., developing 36 b.h.p. at 1500 r.p.m.

Details of Construction

Engine and gearset form a unit construction with four speeds, central controls, plate clutch, pump water circulation, magneto ignition, hollow crankshaft lubrication and vaporization assisted by the induction tract passing through the cylinder block. Behind the tubular radiator is a three-ply diaphragm to regulate the cooling effect as between the extremes experienced during summer and winter.

The back axle ratio (worm drive) is 6.25 to 1, the gearset ratios being: Bottom, 5.27; second, 2.61; third, 1.58; fourth, direct; reverse, 8.23. All brakes expand within the rear wheel drums, while the steering lock affords a turning circle of just under 40 feet. The frame is of 3/16 in. stock, 5 in. deep and 3 in. wide, the power plant being three-point suspended, the front suspension through the agency of a rubber block.

The wheelbase is 138 in.; track, 60 in. front, 58 in. rear; ground clearance, 10½ in., with 36 x 6 pneumatics.